1953.

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QUEENSLAND.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE AND STOCK

FOR

THE YEAR 1952-53.

PRESENTED TO PARLIAMENT BY COMMAND.

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18 JAN 1954

ORGANISATION OF THE DEPARTMENT AS AT 30th JUNE, 1953.

SECRETARY FOR AGRICULTURE AND STOCK .. .. Hon. H. H. Collins, M.L.A.

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Assistant Under Secretary	W. T. Gettons, A.I.C.A.
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Accountant	E. C. Sadler, A.A.U.Q.

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Director of Regional Experiment Stations	W. G. Wells.
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Director of Sheep Husbandry	G. R. Moule, B.V.Sc.
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Pig Branch—	
Officer in Charge	F. Bostock.
Poultry Branch—	
Officer in Charge	P. Rumball, R.D.A.

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Director of Field Services	R. A. Paul, B.Sc.Agr.
Research Branch—	
Director of Research	L. E. Nichols, B.Sc.Agr., A.R.A.C.I.

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Director of Marketing	H. S. Hunter.
Assistant Director of Marketing	C. H. P. Defries, H.D.A., B.Com., A.F.I.A.
Standards Branch—	
Standards Officer	F. B. Coleman

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DEPARTMENTAL SERVICES IN BRIEF.

To the Producer—

★ Advice on farming and pastoral problems.

★ Continuous research into production and distribution problems.

★ Controlling the spread of pests and diseases of crops and stock.

★ Testing stock for various diseases and immunising cattle against tick fevers.

★ Controlling the movement of stock to prevent spread of disease and to curb stealing of stock.

★ Preparing and distributing vaccines, seed inoculum, etc.

★ Assisting stud sheep breeders through the wool biology laboratory.

★ Production recording of purebred and commercial herds of dairy cattle.

★ Soil conservation service.

★ Silo construction advisory service.

★ Soil and water analyses and recommendations.

★ Improving planting material by seed certification, approval of runners, etc.

★ Maintaining standards of seeds, stock foods, fertilizers, etc.

★ Conducting investigations into canning, quick-freezing, etc.

★ Distributing monthly journal at nominal charge.

★ Market price reporting and crop reporting and forecasting.

★ Protecting useful birds and animals.

To the Consumer—

★ Every carcase sold in the main centres of population is inspected at slaughter for wholesomeness.

★ A programme of testing of dairy cattle for tuberculosis and elimination of affected animals now embraces most of the milk supply of the State.

★ The Department maintains a check on the quality of raw milk delivered to most depots throughout the State. Over 100,000 tests are made annually in Brisbane alone.

★ Grade standards have been established for most fruits and vegetables to keep poor fruit off the market. Retailing is also supervised in the consumer's interests.

★ Seeds are examined and fertilizers, pest destroyers, etc., registered to ensure that standards are maintained.

★ Technical researches of the Department have helped the development of refrigerated transport of fruit and vegetables to the outback.

★ Free advice on fruit and vegetable growing in the backyard is given to hundreds of householders every year.

★ Government representation on marketing boards ensures that the consumer's rights are not overlooked.

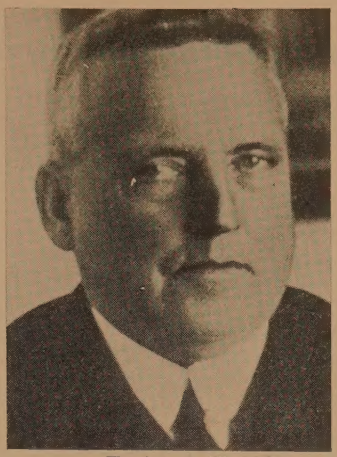
★ ★

Key to Departmental Services.

Centre.	Full-time Services Provided.
Allora	Dairying.
Alpha	Stock Inspection.
Atherton	Agriculture, Cattle, Pigs, Poultry, Soil Conservation, Stock Inspection, Veterinary Services.
Ayr	Agriculture, Entomology, Stock Inspection, Regional Experiment Station, Soil Chemistry.
Barcaldine	Sheep and Wool, Veterinary Services.
Beaudesert	Agriculture, Dairying, Stock Inspection, Slaughtering Inspection.
Beenleigh	Horticulture.
Biggenden	Dairying.
Biloela	Agriculture, Dairying, Pigs, Stock Inspection, Regional Experiment Station.
Blackall	Sheep and Wool.
Boonah	Agriculture, Dairying, Stock Inspection.
Boondooma	Stock Inspection.
Bowen	Horticulture, Stock Inspection.
"Brian Pastures"	Pasture Research Station (Australian Meat Board Station).
Brisbane	Central Administration and all services; Animal Health Station (Yeerongpilly).
Bundaberg	Agriculture, Dairying, Poultry, Stock Inspection.
Caboolture	Dairying, Horticulture.
Cadarga	Stock Inspection.
Cairns	Horticulture, Plant Pathology, Stock Inspection, Horticultural Field Station (Kamerunga), Slaughtering Inspection.
Charleville	Sheep and Wool, Stock Inspection Veterinary Services
Charters Towers	Stock Inspection.
Chinchilla	Dairying, Stock Inspection.
Clare	Tobacco Experiment Farm; Pasture Pilot Plots.
Clermont	Cattle, Stock Inspection.
Cloncurry	Stock Inspection, Veterinary Services.
Coolangatta	Stock Inspection.
Cooroy	Dairying, Horticulture.
Crow's Nest	Dairying, Stock Inspection.
Cunnamulla	Sheep and Wool, Stock Inspection.
Currumbin	Horticulture.
Dalby	Dairying, Sheep and Wool, Veterinary Services, Stock Inspection.
Emerald	Cattle, Sheep and Wool, Stock Inspection.
Esk	Dairying.
Gatton	Agriculture, Dairying.
Gayndah	Agriculture, Cattle, Horticulture, Stock Inspection, Pastures, Soil Conservation.
Gladstone	Dairying, Stock Inspection.
Goombungee	Dairying.
Goondiwindi	Agriculture, Stock Inspection.
Gympie	Agriculture, Dairying, Horticulture. Stock Inspection.
Helidon	Stock Inspection.
Hermitage	Regional Experiment Station.
Hughenden	Sheep and Wool, Stock Inspection.
Ingham	Stock Inspection.
Inglewood	Agriculture, Tobacco Experiment Station
Injune	Stock Inspection.
Innisfail	Dairying, Stock Inspection.
Ipswich	Agriculture, Dairying, Poultry, Stock Inspection, Slaughtering Inspection.
Jandowae	Dairying, Stock Inspection.
Julia Creek	Sheep and Wool, Stock Inspection.
Kairi	Regional Experiment Station, Cattle
Killarney	Dairying, Stock Inspection.
Kingaroy	Agriculture, Cattle, Dairying, Soil Conservation, Stock Inspection, Veterinary Services, Slaughtering Inspection.
Laidley	Dairying.
Lake Nash	Stock Inspection.
Longreach	Sheep and Wool, Stock Inspection.
Mackay	Agriculture, Dairying, Stock Inspection.
Malanda	Dairying.
Mareeba	Agriculture, Stock Inspection, Tobacco Experiment Farm.
Maryborough	Dairying, Horticulture, Stock Inspection, Veterinary Services, Slaughtering Inspection.
Miles	Stock Inspection.
Millmerran	Dairying, Stock Inspection.
Monto	Dairying, Stock Inspection.
Mount Isa	Stock Inspection.
Mundubbera	Dairying, Stock Inspection.
Murgon	Dairying, Stock Inspection, Pigs, Dairy Research Laboratory.
Nambour	Dairying, Horticulture, Entomology, Plant Pathology, Stock Inspection, Maroochy Experiment Station (Horticulture).
Nanango	Dairying, Stock Inspection.
Normanton	Stock Inspection.
Oakey	Dairying.
Oonoonba	Animal Health Station.
Ormiston	Redlands Experiment Station (Horticulture).
Palmwoods	Horticulture.
Pittsworth	Cattle, Dairying, Soil Conservation, Stock Inspection.
Proston	Dairying.
Quilpie	Stock Inspection.
Rockhampton	Agriculture, Cattle, Dairying, Horticulture, Poultry, Slaughtering Inspection, Stock Inspection, Veterinary Services, Entomology.
Roma	Sheep and Wool, Stock Inspection, Veterinary Services.
South Johnstone	Bureau of Tropical Agriculture; Utchee Creek Pasture Sub-station; Cattle.
Southport	Dairying, Horticulture, Stock Inspection.
Stanthorpe	Horticulture.
St. George	Sheep and Wool, Stock Inspection.
Toogoolawah	Stock Inspection.
"Toorak"	Sheep Field Station.
Toowoomba	Agriculture, Dairying, Entomology, Horticulture, Pigs, Plant Pathology, Poultry, Slaughtering Inspection, Soil Conservation, Stock Inspection, Veterinary Services. Dairy Research Laboratory.
Townsville	Horticulture, Poultry, Slaughtering Inspection, Stock Inspection, Veterinary Services, Cattle.
Wallan-garra	Fruit Inspection.
Wandoan	Agriculture, Stock Inspection.
Warwick	Agriculture, Dairying, Pigs, Sheep and Wool, Slaughtering Inspection, Soil Conservation, Stock Inspection, Pastures.
Winton	Sheep and Wool, Stock Inspection.
Wondai	Stock Inspection.
Wowan	Dairying.
"Wrotham Park"	Gulf Exploratory Farm.
Yarraman	Stock Inspection.

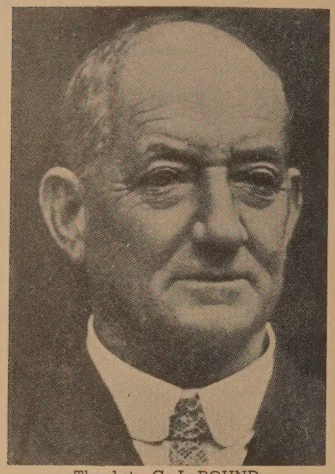
SOME PAST HEADS OF ANIMAL INDUSTRY AND DAIRY BRANCHES.

H. R. SEDDON
(Animal Health Services)

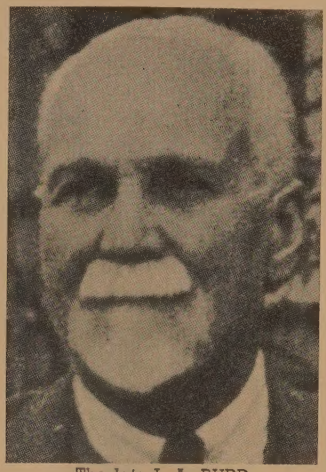


The late A. H. CORY
(Animal Health Services)

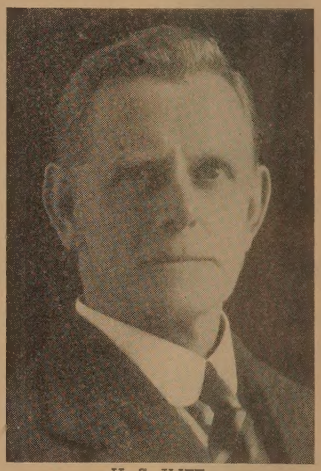
The late L. D. CAREY
(Animal Health Services)



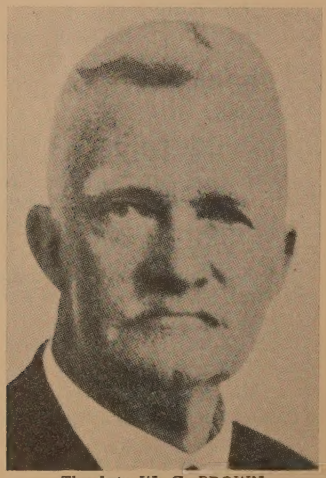
The late C. J. POUND
(Animal Health Services)



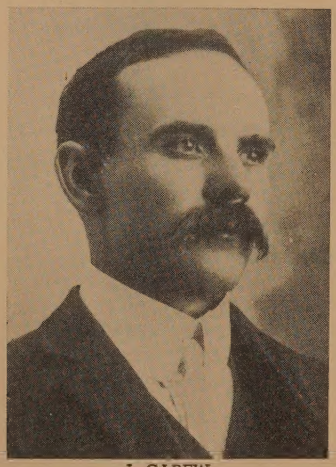
The late J. A. RUDD
(Animal Health Services)



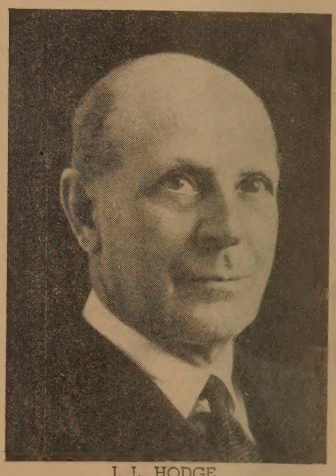
H. S. ILIFF
(Brands)



The late W. G. BROWN
(Sheep and Wool)



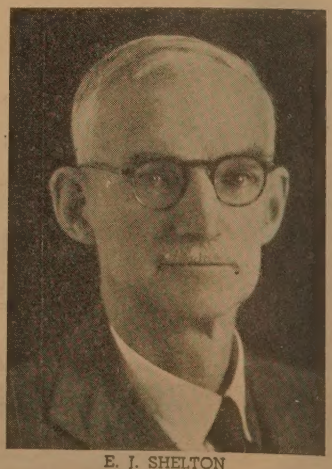
J. CAREW
(Sheep and Wool)



J. L. HODGE
(Sheep and Wool)

The late A. E. GRAHAM
(Dairying, later Under Secretary)

The late C. McGRATH
(Dairying)



E. J. SHELTON
(Pig Raising)

REPORT OF THE DEPARTMENT OF AGRICULTURE AND STOCK FOR THE YEAR 1952-53.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

DEAR SIR,—In accordance with recent practice this section of the Report is followed by the reports of the five Divisional chiefs; a reading of these first six sections will give a conspectus of the year's activities and developments. Consolidated tables of 1952-53 production statistics, to be found on pages 6-7 will also permit a rapid assessment of the relative performances within the main primary industries. In the succeeding pages will be found fifteen individual Branch reports which record activities in much more detail.

The Divisional and Branch Reports record generally favourable conditions for the period under review. However, after those reports were written there was a marked deterioration and the winter was one of the driest on record. While pastoral areas remained in fair heart, drought to near-drought conditions prevailed generally in the agricultural and dairying areas. Generally good relief rains were received at the end of August and spring prospects are now fairly good.

During this drought period chief concern was felt in respect of wheat. A record planting of some 800,000 acres had been planned but reports of crop correspondents indicated that only 300,000 acres had been planted at the end of June. A considerable number of farmers later dry-planted in the hope of early spring rains and these hopes have been largely fulfilled. It is now computed that 550,000 acres have been planted and, in spite of the short growing season now remaining, a yield of 8,000,000 to 10,000,000 bushels is a reasonable expectation if harvesting conditions are favourable. Consumption of wheat in Queensland is now approaching 10,000,000 bushels.

Reference to Tables 1 and 2 will show that production was generally well above pre-war averages and records were established in the case of sugar, wheat, barley, linseed, and beef. Wool, with an estimated value of £62 millions, again led industry earnings, while raw sugar was second with an estimated value of £40 millions.

EXPORT MARKETS.

Although production has been relatively satisfactory, changes and difficulties are developing in the export markets upon which Australia depends for overseas credits for the purchase of so many of the necessities of modern life.

The existence of grave shortages of food and clothing for three-fourths of the world's population does not guarantee a profitable export market; people lacking the capacity to purchase may starve while producers are left with burdensome surpluses on their hands. The export market, as limited by the capacity to pay, has become increasingly competitive and a number of Australian lines have been priced out of the world's markets by other countries or by substitutes.

The necessity for Australia to reduce costs of production has latterly received great public emphasis. However, the remedy is not, as so many people seem to think, solely or perhaps even primarily in the hands of the primary producer. While admittedly some primary industries have still a deal of leeway to make up, the efficiency of others compares well with any standards. The Queensland cane grower, for example, is a more efficient farmer than he was five years ago—in that he is producing more sugar per acre and more per man—but his costs are about double what they then were. It is not within his personal capacity to effect profound reductions in costs; it is part of a national problem.

The Government of the United Kingdom has evinced a desire to depart from the bulk purchase system which has operated since 1939 and to return to the trader-to-trader basis. It is obvious that this will present many problems, particularly in respect of the commodities, such as meat and sugar, for which long-term contracts have been concluded. It may be accepted that as trade returns to normal channels so will there be increasing competition on the basis of quality. The Australian producer must therefore devote his attention to this aspect of marketing, and here perhaps he has a greater measure of control than in the realm of costs of production.

The present seven-year butter and cheese contract with the United Kingdom Government expires in 1955. This contract limits variations in prices to 7½ per cent. in any one year, but although the full 7½ per cent. increase was granted in 1952 the British Ministry of Food agreed only to a 3¾ per cent. increase this year, giving a price of 3s. 7·66d. per lb. as against an ascertained factory cost of production of 4s. 7·62d. per lb. Butter must meet not only the cost competition of other countries but also that of margarine; in addition, the termination of bulk buying will expose it to steep quality competition.

TABLE 1.
PASTORAL AND DAIRYING STATISTICS.
(SOURCE—QUEENSLAND GOVERNMENT STATISTICIAN).

—	Unit.	Average 1934–35—1938–39.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53. (a)
Beef Cattle	Number	4,631,482	4,568,966	4,872,018	5,293,350	5,137,715	5,378,397
Cattle and Calves Slaughtered (b)	Number	1,046,111	1,088,552	1,101,914	1,181,442	1,057,406	1,266,889
Beef and Veal produced	Tons	180,717	202,518	211,496	232,398	177,608	253,847
Dairy cattle	Number	1,387,011	1,422,831	1,432,760	1,440,198	1,296,659	1,372,998
Total milk produced for all purposes	,000 gal.	278,227	277,152	281,125	278,111	181,148	285,750
Butter produced	Tons	54,722	47,781	48,785	47,911	28,212	49,425
Cheese produced	Tons	5,077	9,394	9,052	8,678	4,700	9,439
Sheep	Number	21,060,513	16,498,957	17,582,152	17,477,578	16,163,518	17,029,623
Wool production	,000 lb.	164,791	156,655	162,256	154,667	138,767	165,000
Sheep slaughtered (b)	Number	1,029,054	878,571	846,470	664,789	725,523	972,113
Mutton produced	Tons	19,192	16,692	16,024	12,467	13,082	18,072
Lambs slaughtered (b)	Number	72,178	115,735	112,847	79,839	77,039	89,360
Lamb produced	Tons	974	1,748	1,649	1,100	1,338	1,740
Pigs	Number	294,776	407,322	391,836	374,991	316,529	335,809
Pigs slaughtered for pork (b)	Number	260,928	216,440	227,927	210,992	171,476	159,511
Pigs slaughtered for bacon and ham (b)	Number	264,306	285,159	276,255	248,989	198,409	241,091
Pork produced	Tons	9,867	12,254	12,911	11,751	8,604	6,594
Bacon and ham produced	Tons	9,269	9,412	10,018	8,764	7,669	9,699

(a) Preliminary figures. (b) Slaughtered for human consumption.

After years of protracted negotiation a fifteen-year meat agreement has been concluded between the United Kingdom and Australian Governments. This agreement provides for the purchase of the exportable surplus of meat at prices related to cost of production; Australia on its part has agreed to carry out developmental works for the expansion of the beef industry. The United Kingdom Government has further undertaken (as in the case of the sugar agreement) to take any necessary steps to preserve contract conditions in the event of a return to trade purchases.

Current advices indicate that the recently drafted International Sugar Agreement preserves the conditions of the Commonwealth Sugar Agreement signed in London in 1951. The latter provides for the annual sale of 314,000 tons of 94 n.t. sugar to the United Kingdom at a price to be negotiated annually on a cost of production basis, and a further 300,000 tons on the preferential U.K. and Canadian markets. Shortfalls in exports by any participant in the Commonwealth agreement may be taken up by other exporters and it is anticipated that the deficiency in South Africa's current exports will open a market for the excess Australian production in 1953.

Canned pineapples have made an important contribution to Australia's dollar and sterling earnings in the post-war years. Price competition has now eliminated the Canadian market, while the sterling market is meeting increased competition from the rehabilitated Malayan industry and the rapidly developing South African industry.

Export prices for grains have dropped materially over the past year, maize declining from 19s. to 13s. 6d. per bushel, sorghum from 16s. 6d. to 11s. 9d., and barley from 18s. to 11s. 7d. An international wheat agreement was concluded in July, 1953, with ceiling and floor prices of 18s. 3·643d. and 13s. 10·071d. (Australian currency) compared with 16s. 1d. and 10s. 8·67d. in the last year of the agreement, which terminated on July 31. However, the United Kingdom would not accept the ceiling price and has not signed the agreement; it remains to be seen to what extent the withdrawal of the most important customer will affect the value of the agreement.

PRODUCTIVITY TRENDS.

In a world seriously undersupplied with food and other agricultural products the need for increasing production is paramount. In general, production of a particular commodity may be increased in two ways—a greater area of land used for its production, or greater production per animal or per unit area of land.

In a sparsely populated country such as Australia production of many commodities can undoubtedly be markedly expanded by increasing the number of farmers, but this is outside the province of the Department of Agriculture. A Department of Agriculture is, however, very directly and intimately concerned with increasing unit production; indeed, this is the main reason for its existence.

Production per unit is not necessarily directly related to total production and it is possible to have rising yields per acre and increasing efficiency while total production is falling. This is well illustrated in the case of maize in Queensland. Due to various reasons, including better strains, the use of hybrid maize, and a better understanding of fertilizers, the yield of maize per acre is gradually rising. But due to the diversion of land to better-paying crops the State's output of maize continues to fall.

We have recently initiated a critical examination of productivity trends, in order to spotlight both achievement and failure to advance at satisfactory rates, with a view to concentrating investigation and extension where it is most needed. For this purpose an extensive series of 30-year "Trend Line" graphs has been prepared in the Division of Marketing and will be incorporated in a separate publication. The trend lines have been calculated from production data recorded by the Government Statistician and for comparative purposes are preferable to averages, which, at best, are historic.

It is obviously impossible to present the results of this investigation in any detail in this report, but Figs. 1-3, representing unit production in the three main animal industries, are interesting examples of these trend line graphs.

TABLE 2.

AGRICULTURAL AND HORTICULTURAL STATISTICS.

(SOURCE—QUEENSLAND GOVERNMENT STATISTICIAN.)

Crop.	Average 1935–1939.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53. (a)
Sugar Cane—						
Cut for crushing (acres) (c)	247,092	258,585	275,313	257,562	273,371	274,757
Cane production (tons)	5,181,124	6,433,556	6,518,042	6,691,706	5,005,172	6,841,536
Yield per acre (tons)	20·9	24·9	23·7	25·9	18·3	24·9
Sugar manufactured (tons)	757,560	910,049	896,413	879,844	704,341	934,614
Wheat—						
Area (acres)	340,055	607,750	600,013	558,780	454,543	724,495
Production (bushels)	4,766,927	14,317,422	11,778,495	8,785,254	6,631,644	18,662,391
Yield per acre (bushels)	14·0	23·6	19·6	15·7	14·6	25·7
Maize—						
Area (acres)	174,628	97,598	115,550	112,467	111,181	108,230
Production (bushels)	3,271,919	2,451,207	3,392,817	3,028,899	2,438,871	2,650,365
Yield per acre (bushels)	18·7	25·1	29·4	26·9	21·9	24·5
Barley—						
Area (acres)	9,777	27,674	25,074	26,099	28,158	71,879
Production (bushels)	153,028	622,323	578,193	489,075	450,222	2,108,979
Yield per acre (bushels)	15·7	22·5	23·1	18·7	16·0	29·3
Oats—						
Area (acres)	8,542	21,278	20,456	16,998	20,839	56,403
Production (bushels)	102,819	418,725	337,566	221,202	262,812	1,302,528
Yield per acre (bushels)	12·0	19·7	16·5	13·0	12·6	23·1
Canary Seed—						
Area (acres)	19,233	13,847	13,016	11,932	19,971	21,124
Production (bushels)	91,616	132,303	126,762	125,961	70,575	339,135
Yield per acre (bushels)	4·8	9·6	9·7	10·6	3·5	16·0
Millet, Panicum and Setaria—						
Area (acres)	*b*	14,103	14,832	20,225	16,008	16,461
Production (bushels)	*b*	250,614	265,734	314,382	173,994	211,089
Yield per acre (bushels)	*b*	17·8	17·9	15·5	10·9	12·8
Sorghum—						
Area (acres)	*b*	48,011	99,362	116,311	169,558	190,619
Production (bushels)	*b*	899,136	2,157,717	3,683,286	2,651,799	3,239,133
Yield per acre (bushels)	*b*	18·7	21·7	22·1	15·6	17·0
Lucerne Hay—						
Area (acres)	50,600	40,331	41,455	33,947	29,791	45,806
Production (tons)	84,808	92,818	98,484	87,177	67,106	106,618
Yield per acre (tons)	1·7	2·3	2·4	2·6	2·3	2·3
Wheaten Hay—						
Area (acres)	5,388	8,261	3,835	3,755	6,807	8,284
Production (tons)	5,379	9,669	4,844	4,638	6,123	11,476
Yield per acre (tons)	1·0	1·2	1·3	1·2	0·9	1·3
Arrowroot—						
Area (acres)	888	587	621	699	507	356
Production (tons)	9,456	7,068	7,506	7,849	5,034	4,054
Yield per acre (tons)	10·65	12·23	12·09	11·23	9·93	11·39
Cotton—						
Area (acres)	55,504	6,222	2,688	2,952	4,480	5,866
Production (lb.)	16,598,485	1,820,776	718,513	1,102,482	1,405,991	2,184,268
Yield per acre (lb.)	299	293	267	373	314	372
Linseed—						
Area (acres)	..	4,193	9,533	14,986	28,580	25,875
Production (bushels)	..	35,019	89,958	142,434	166,965	269,244
Yield per acre (bushels)	..	8·35	9·44	9·05	5·84	10·40
Peanuts—						
Area (acres)	14,542	24,290	17,697	16,656	13,312	18,920
Production (lb.)	13,641,059	22,238,369	17,710,141	11,896,145	10,159,806	18,901,157
Yield per acre (lb.)	938	916	1,001	714	763	999
Potatoes—						
Area (acres)	12,144	11,184	11,624	10,783	11,465	11,641
Production (tons)	20,929	27,511	30,681	24,725	33,001	35,051
Yield per acre (tons)	1·7	2·5	2·6	2·3	2·9	3·0
Pumpkins—						
Area (acres)	21,829	28,236	28,349	26,292	26,373	28,016
Production (tons)	52,248	68,801	72,221	58,260	53,130	69,464
Yield per acre (tons)	2·4	2·4	2·5	2·2	2·0	2·5
Tobacco—						
Area (acres)	3,659	1,678	2,677	4,142	5,038	4,339
Production (lb.)	2,033,736	1,625,792	2,539,592	2,144,278	4,666,699	3,431,300
Yield per acre (lb.)	556	969	949	518	926	791
Apples—						
Area (acres) (bearing)	3,320	4,823	4,522	4,740	4,928	4,965
Production (bushels)	252,756	361,830	536,742	448,129	494,510	204,754
Yield per acre (bushels)	76	75	119	95	100	41
Bananas—						
Area (acres) (bearing)	6,016	6,325	5,734	5,240	4,036	3,662
Production (bushels)	651,558	611,605	533,960	548,056	410,730	353,710
Yield per acre (bushels)	108	97	93	105	102	97
Citrus—						
Area (acres) (bearing)	3,303	4,240	4,373	4,355	4,451	4,512
Production (bushels)	349,180	584,301	494,640	597,212	470,271	431,753
Yield per acre (bushels)	106	138	113	137	106	96
Pineapples—						
Area (acres) (bearing)	4,766	6,469	6,807	6,957	5,549	6,258
Production (bushels)	1,624,362	2,119,011	2,374,748	2,507,391	1,785,896	2,209,185
Yield per acre (bushels)	341	328	349	360	322	353
Beans, French—						
Area (acres)	2,733	4,529	4,579	4,809	4,930	5,205
Production (bushels)	267,842	449,132	509,931	512,964	452,544	555,168
Yield per acre (bushels)	98	99	111	107	92	107
Onions—						
Area (acres)	1,155	2,828	2,371	2,399	2,527	2,813
Production (tons)	3,468	12,535	13,137	7,256	9,691	11,542
Yield per acre (tons)	3·0	4·4	5·5	3·0	3·8	4·1
Tomatoes—						
Area (acres)	5,137	5,632	5,589	6,069	5,511	5,833
Production (bushels)	502,171	635,734	643,246	614,914	641,043	732,613
Yield per acre (bushels)	98	113	115	101	116	126

(*a*) Preliminary figures. (*b*) Very small amounts. Exact figures not available.
(*c*) Figures supplied by Bureau of Sugar Experiment Stations.

Fig. 1 depicts the annual production of beef and veal related to the total number of cattle in the State. There are, of course, very considerable fluctuations in annual output but the calculated trend line shows that over the past 30 years the annual output of beef and veal per head of cattle population has increased by some 50 per cent., from about 50 lb. in 1921-22 to about 75 lb. in 1951-52. This increase is due to a variety of causes, which include improvement of properties, better cattle, better control of diseases and pests, and more efficient marketing. It is a very gratifying achievement and will spur both the cattle industry and the technical services to greater efforts.

In Fig. 2 is graphed the production of wool (shorn and skins) per head of sheep population. Here there has been a steady gain of about 10 per cent., and, as in the case of beef, there have been several contributory factors.

The dairy industry presents a different picture, as shown in Fig. 3, where milk production per head of total dairy cattle is graphed for the same period. The great fluctuation in yield detracts from the accuracy of the trend line and it may well be that the downward trend is not as great as the graph suggests. Nevertheless, it is clear that there is a downward trend where there should be an upward trend and this constitutes a challenge to all directly and indirectly concerned with this important industry.

Although the upward trends in production per animal in the wool and beef industries are gratifying, the position in respect of total numbers is not. After a general upward trend sheep numbers were very seriously depleted in the mid-forties and since 1947 have hovered around the 16·5 million mark even though there has been quite considerable property improvement in that period. Cattle numbers have shown a steady upward trend since 1928, but an accelerated rate must be achieved and maintained if proper use is to be made of the State's grazing lands.

THE RECOGNITION OF GRASS.

Natural grass was the first and is still the main fodder crop. The existence of grass has been taken for granted and it is only in comparatively recent times that much thought has been given to the fact that it is, after all, a crop plant and should be studied and treated in the same way as other crop plants. Following an international conference in England nearly a quarter of a century ago, there has been a steadily growing world-wide interest in grass as a cultivated and conservable crop.

The most profitable type of farming is, of course, dependent upon various factors, of which the most important are probably the price of the product and the value of the land. Extensive methods must give way to intensive methods as land values rise, but under conditions of relatively low land values extensive and apparently inefficient methods may well be the most profitable. Any criticism of past methods should therefore be tempered by this realisation.

Grass is of particular importance to Queensland, since the wool, meat, and dairy industries are almost entirely dependent upon grass, mainly natural pastures. But until the last very few years interest in stimulating grass production has not extended beyond the sowing of paspalum or Rhodes grass after the initial clearing of the coastal and sub-coastal land. The result is that though our pastures have been consistently stocked for only half a century deterioration in carrying capacity and changing botanical composition are apparent everywhere; herein no doubt lies much of the explanation of the downward trend of unit milk production illustrated in Fig. 3. The increasing intrusion of mat grass in dairying areas, feathertop in the West, and the dominance of black spear grass in the eastern cattle lands, are all additional evidence of pasture deterioration.

There are, however, healthy signs that this attitude is changing. An agrostology or grass section was formed within the Agriculture Branch some five years ago and has established a network of sown pasture experiments and demonstrations throughout fair to good rainfall areas of the State; about 160 of these are now in progress covering species trials, fertilizer application, cultural renovation, rotational grazing, and the incorporation of legumes. At the new cattle research station at Brian Pastures an investigation will be made of the widely established practice of burning.

Interest in irrigated pastures has been greatly stimulated by the establishment of stations at Gatton, Theodore, and on the Burdekin. Pasture growth under the warm conditions of Queensland has been very impressive. The small staff available is now fully occupied in meeting farmers' requests for assistance in laying down irrigated pastures.

Nowhere, even under irrigated conditions, is the growth of grass regular throughout the year. Consequently if a stable number of stock is to be maintained on a given area mowing and conservation must be practised if the number of stock is to be reasonably high. Otherwise the stocking capacity will merely be what the pastures can carry at their worst. Moreover, mown and properly conserved grass retains a high proportion of its protein while dry standing grass rapidly loses its nutritive qualities.

The pay-off of reliance on dry standing pastures, unsupplemented by hay or silage conserved with high protein content, has been well illustrated in dairy feeding demonstrations conducted over the past few years. On the surface it would appear that, contrary to world-wide experience, the feeding of concentrates is uneconomic in Queensland. This result is attributable to the fact that the quality of the roughage ration is so low that the concentrate is used up as a maintenance ration rather than as a milk stimulant. Only in a few cases was the quality of the roughage sufficiently high to warrant concentrate feeding.

Grass is more easily harvested and conserved than are most other crops and greatly increased use of grass hay and silage is perhaps the outstanding characteristic of world agriculture today. To reduce the labour requirements of pit and tower silage there is now a tendency to adopt aboveground stack silage in the so-called "wedge" or "clamp" silo. Wedge-shaped stacks of mown green pasture are built up with a buck-rake attached to a tractor, the passage of the tractor in building the wedge applying the necessary consolidation pressure.

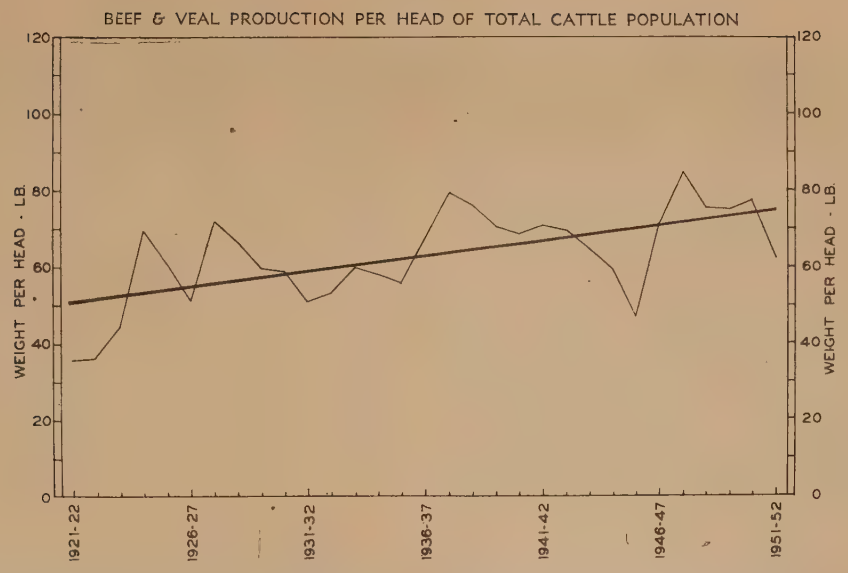


Fig. 1.—Production of Beef and Veal During the Period 1921-1952, Recorded as Annual Production Per Head of Cattle (Dairy and Beef). Data from Commonwealth Government Statistician.

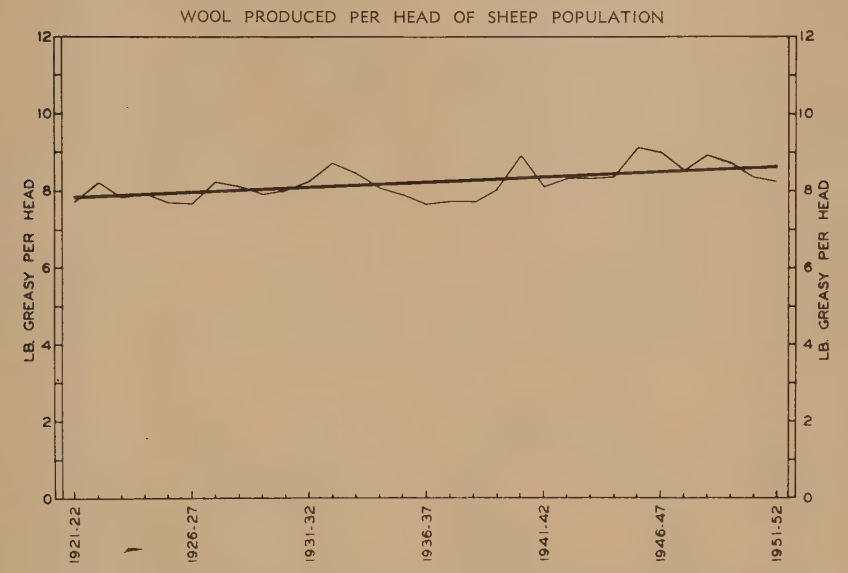


Fig. 2.—Production of Shorn and Skin Wool During the Period 1921-1952 Expressed as Pounds of Wool Per Head of Sheep. Data from Commonwealth Government Statistician.

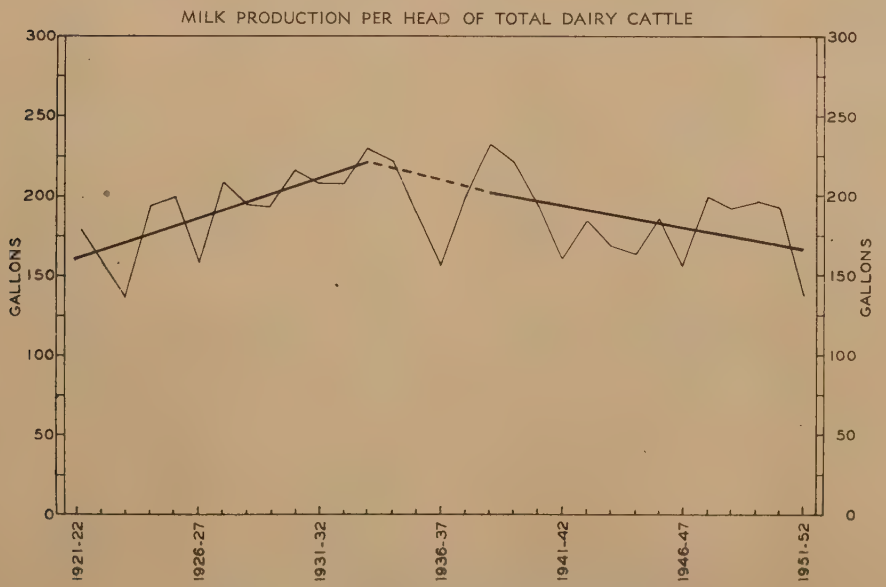


Fig. 3.—Production of Milk During the Period 1921-1952 Expressed as Annual Yield in Gallons Per Head of Dairy Stock. Data from Commonwealth Government Statistician.

This form of silo is subject to a fair amount of wastage and is suitable for season to season, rather than long-term, conservation, but the construction is simple and economic of labour.

During the year two officers visited the southern States to collect detailed practical information on wedge silo conservation with a view to its thorough testing under Queensland conditions.

In spite of sustained advocacy, fodder conservation remains at a depressingly low level. The records of the Government Statistician reveal that over the past five years the average quantity of silage put by has only been sufficient to supply Queensland's dairy herds with about one day's ration, while if all the hay had been fed to the dairy cattle it would have sufficed for eight days' ration! Although the area planted to fodder crops increased last year the area planted to lucerne declined.

Past prices for beef and wool have precluded any serious thought of grass-hay conservation on pastoral lands; but sustained high prices have stimulated interest. During the year the Department acquired two hay-baling machines for the purpose of demonstrating grass-hay conservation. A small but growing band of pastoralists have also purchased or ordered balers to test the economics of the practice. Pastoral Queensland is, of course, the victim of a restricted summer rainfall season with the result that grass will be in a condition for harvesting and baling for only a short period each year.

Concurrently with the study of grass production and conservation, studies are also being made of the growth rates and grazing habits of cattle.

It is well known that Queensland cattle not only do not make steady growth throughout the year but regularly lose weight at certain times. It is obviously important to know precisely the times and conditions under which weight is gained or lost and how the period of weight loss may be reduced or eliminated.

Studies of grazing behaviour in Queensland are in their very early stages but they are demonstrating that the experience of other countries cannot be accepted at face value. Observations are covering such points as the movement of grazing cattle over the pasture, and the time spent in grazing, resting, sheltering from the sun, and so on. In Queensland it is apparent that cows prefer to graze at night so that the practice of enclosing them in small bare night paddocks near the bails has little to commend it. A cow requires about 30 lb. daily of dry matter and on some of our lush summer pastures it is physically impossible for the cow to eat enough "sappy" grass to get this dry matter; a supplementary ration of hay is therefore indicated at the time when pastures appear at their best! In North Queensland beef cattle spent less time grazing on long pastures in summer than on shorter pastures and failed to maintain weight gains.

These are illustrative of some of the problems being tackled by the new Cattle Husbandry Branch.

The Division of Plant Industry of the Commonwealth Scientific and Industrial Research Organization has extended the scope of its pasture research activities in Queensland and during the year the Associate Chief of the Division, Dr. J. G. Davies, took up residence in Brisbane in charge of the pasture team. Particular attention has also been paid to Queensland's needs by the Plant Introduction Service recently sending collecting expeditions to North Africa.

During the year there was constituted a Pasture Liaison Committee comprising representatives of C.S.I.R.O., the University of Queensland, and this Department; the objectives of the Committee are to co-ordinate the expanding research in pasture problems, eliminate unnecessary overlapping, and bring a closer relationship between the research-experimentation-extension activities.

THE DAIRYING INDUSTRY.

Since half the primary producers of the State are registered dairymen anything which affects the welfare of this industry is of serious concern to all sections of the community.

The recent report of the Dairy Industry Investigation Committee appointed by the Commonwealth Government drew attention to the effects of consumer resistance on butter sales. *Per capita* consumption of butter fell by some 8 per cent. during the year 1952-53 and the Committee advanced the view that this was largely due to the increase in retail price to 4s. 1½d. which became effective in July, 1952. The Committee further expressed the view that any further price rise would accentuate consumer resistance and force the industry to export more butter to the less remunerative United Kingdom market.

The United Kingdom price is presently £20 7s. 6d. per cwt. compared with the guaranteed ex-factory price of £25 3s. 6d. per cwt. The Commonwealth Government guaranteed price applies to the butter consumed in Australia plus 20 per cent., and is made up of the consumer price fixed by Price Fixing Authorities and a Commonwealth subsidy of up to £16,000,000, which in 1952-53 amounted to 9·1d. per lb.

In consequence of the Investigation Committee's recommendations the usual annual price adjustment based on the cost-of-production formula was not granted by the Commonwealth Government and the industry is now selling local butter at 1·72d. per lb. less than the determined cost-plus-profit, while export butter in excess of 20 per cent. of the Australian consumption returns to the farmer about 1s. per lb. less than this ascertained cost.

This circumstance prompts the question of whether the industry is not still too much based on a butter economy and neglecting the promotion of sales of other products which may prove more profitable. In virtually every country of the world butter consumption is falling with, in many cases, a consequent rise in consumption of the cheaper margarine.

In this connection it is of interest to contrast the pre-war and 1950 utilization of milk products in the Netherlands (a country greatly dependent on dairying), the United States

(with its high standards of living) and Australia. Wholemilk fed to calves, &c., on the farm is excluded in each case.

—	Netherlands.	U.S.A.	Australia.
	Per cent.	Per cent.	Per cent.
Fluid Milk—			
Average 1934–8	22	42	14
1950 ..	28	48	20
Butter—			
Average 1934–8	52	43	80
1950 ..	42	28	65
Cheese—			
Average 1934–8	21	6	4
1950 ..	21	10	8
Other—			
Average 1934–8	5	9	2
1950 ..	9	14	7

A study of these figures suggests that Australia still has an undeveloped market for wholemilk, cheese, and other products such as milk powder. The dairying industry might well explore the possibility of increasing local sales of wholemilk (especially coloured and flavoured milks), milk powder, cottage cheeses, and cream. Some more profitable outlet must also be found for skimmed milk, a large proportion of which is fed wastefully to pigs in the absence of a profitable market. It is pleasing to note that twelve dairy factories have now installed equipment for the drying of milk and milk by-products.

The question of costs must receive the close attention of the industry to the extent that they be within the control of the industry. Possibly the solution lies in the greater diversification of operation on dairy farms.

As noted elsewhere, the Commonwealth Dairy Industry Efficiency Grant has been extended for a further five years under conditions similar to those of the initial grant. Much of the work carried out during the first period is only now beginning to achieve results and it is hoped that the effects will now be cumulative. One of the most effective parts of the approved programme has been the Group Herd Recording and it is regrettable that the Commonwealth has seen fit to further limit the proportion of the grant which can be so spent.

A survey of the first four years of group herd recording, covering 84,000 lactation records, has demonstrated conclusively the importance of the month of calving on milk production. Under Queensland conditions, cows which commence their lactation period in the quarter July-September produce nearly 20 per cent. more butterfat than those which calve during the quarter January-March. It is obvious that better herd management along these lines can increase production without increasing costs. The concurrent herd wastage survey has also revealed avenues for improvement in herd management.

There has been an improvement in quality of butter but the position remains unsatisfactory. The basic reason is, as set out in last year's report, an inadequate price differential between choice and first and second grades. With a return to trade buying in the United Kingdom quality may well be a critical factor in arranging export sales. The Australian Agricultural Council has directed that a Committee representative of the Commonwealth and all States be set up to examine and report upon this problem of the quality of Australian butter.

The percentage of choice and first-grade cheese (86·3 per cent.) manufactured during the year constituted a record. This is a gratifying result of efforts made by this industry over some years to raise quality standards.

In recent years pasteurised milk factories have been established in most of the larger towns. These factories are equipped with the most modern machinery, and this, allied with the extension of the Departmental laboratory control scheme to the country areas, is ensuring a safe, high-quality milk supply for consumers.

The transport of milk from country chilling factories to the pasteurisation factories in road milk tankers has almost entirely displaced cartage in cans, with a benefit to quality and the elimination of spillage losses en route.

The tuberculosis eradication scheme that has been progressively applied since 1945 to dairy herds from which milk is drawn for the major cities and towns, and from which cream is supplied to certain factories, was extended during the year.

In the following list of Queensland cities and towns with an estimated population of 1,000 or over, those marked with an asterisk are served by herds within the formal tuberculosis testing scheme. It will be noted that the majority of such towns enjoy the safeguard provided by testing; of those that do not, many are not large consumers of fresh milk and all have intermittent tests made by Departmental veterinarians.

*Atherton
*Ayr
Babinda
Barcaldine
*Beaudesert
*Beenleigh
Biggenden
Biloela
Blackall
*Boonah
*Bowen
*Brisbane
*Bundaberg
*Burleigh Heads
*Caboolture
*Cairns
*Caloundra
Charleville
*Charters Towers
Childers
Chinchilla
Clermont
Cloncurry
Collinsville
*Coolangatta
Cooroy
Cunnamulla
*Dalby
Edmonton
Emerald
*Gatton
Gayndah
Gladstone
*Goodna
Goondiwindi
*Gordonvale
*Gympie
Herberton
*Home Hill
Howard
Hughenden
*Ingham
Inglewood
*Innisfail
*Ipswich
*Kilcoy
*Kingaroy
Laidley
Longreach
*Mackay
Mareeba
*Maroochydore
*Maryborough
Mitchell
Monto
Mossman
Mount Isa
Mount Morgan
*Murgon
*Nambour
Nanango
*Oakey
*Pittsworth
Proserpine
*Redcliffe
*Rockhampton
Roma
*Rosewood
St. George
Sarina
*South Johnstone
*Southport
*Stanthorpe
Texas
*Toowoomba
*Townsville
*Tully
*Warwick
Winton
Wondai
*Yeppoon.

There are now 400,000 head of dairy cattle within the testing scheme. A total of 281,654 tests was made during the year, compared with 160,264 in the previous year.

Once again an increase in the number of private practitioners undertaking tuberculin testing under contract to the Department is reported. Thirty-one veterinarians have set up practice in country areas on receiving Departmental contracts.

Routine testing is applied at intervals to all herds within the scheme so that any foci of infection that develop can be quickly eliminated. In herds that have been under test for several years, the incidence of tuberculosis is usually found at re-testing to be nil or extremely low. In such cases, the period between tests has been extended to two years.

THE PASTORAL INDUSTRIES.

The beef cattle and sheep industries play a major role in the economy of Queensland and together contribute around one-third of the State's income.

The number of cattle registered on statistical returns rose by some quarter of a million over the 1951-52 figure and stands at three-quarters of a million above the 5-year pre-war average. This increase was contrary to the forecasts from within the industry, which had evidently over-assessed 1951 drought losses. The number of cattle and calves slaughtered for human consumption was 1,266,889, compared with 1,057,406 in 1951-52 and 1,046,111 in the 1934-39 period.

As indicated in Fig. 1 there is a quite firm upward trend in the production of beef per head of cattle per annum, due largely to earlier turnoff in better condition. Although beef cattle numbers dropped sharply in the 1920's there has been a remarkably steady increase at the rate of about 34,000 per year since 1928-29.

Technically a considerable degree of progress has been made in the post-war era but naturally this has had too little time to affect commercial production in full measure. Nevertheless, the know-how of the cattle man is now distinctly better than it was a decade ago: New medicaments have greatly improved the opportunities for the control of external parasites; the control of pleuro-pneumonia is improving rapidly; a number of obscure diseases have been elucidated; the new Cattle Husbandry Branch is attacking the problem of seasonal nutrition; interest in new breeds and better strains is developing; higher prices have allowed property improvement; interest in the improvement of pastures is developing with expanded C.S.I.R.O. and State services; there is now a market for unwanted dairy stock; and with the assistance of the Australian Meat Board two beef cattle research stations are in process of establishment.

It would therefore appear that we may anticipate a steady increase in the annual production of beef per head of total cattle population. Unfortunately the rate of increase of total numbers is much too slow; there is a need for more cattle properties or a much expanded development of the existing larger holdings.

The number of sheep increased by some 870,000 to 17,034,500, a figure about four millions below the 1934-39 average and over eight millions below the 1942-43 record. Sheep are being used with gradually increasing efficiency, as indicated by Fig. 2, but the volume of wool production is mainly determined by the total number of sheep.

Like the cattle industry, the technical knowledge of sheep and wool production has advanced very considerably over the past decade. The Mules operation for the control of fly strike is becoming standard practice; control of internal parasites by drenching has been placed on a sound basis; improved insecticides have simplified the control of external parasites; a great deal has been found out about drought feeding; long-range breeding experiments are giving important leads to sheep breeders and the Departmental fleece-testing laboratory will greatly aid selection of stock; a close study is being made of infertility and neo-natal mortality; and the extension services have been multiplied. Added to this is the fact that there has been a great deal of property improvement.

In the face of these undoubted advances one must conclude that the problem of restoring sheep numbers is not primarily technical but is rather an economic problem.

A very important event was the constitution of a Pastoral Advisory Committee to advise the Minister and the Department in the provision of technical services for the pastoral industries. The Committee consists of the Minister (Chairman), Under Secretary (Deputy Chairman), two cattle industry representatives, two sheep industry representatives, and the Director of Animal Industry.

SUGAR.

Sugar has increased still further its lead over other agricultural industries. In the 1952 season, 6,841,536 tons of cane were milled for the manufacture of 934,614 tons of 94 n.t. sugar. In both respects the season established a record, exceeding the 1950 cane crop and the 1948 sugar output by 150,000 tons and 24,500 tons respectively; the acreage harvested, 274,757, was slightly below the peak figure of 1949, while the quality ratio of 7.32 tons of cane per ton of sugar was slightly worse than the average of the previous five years—7.26. Home consumption sugar (477,481 tons) realised £44 3s. 0d. per ton and export sugar £41 2s. 0d. per ton, the overall price being £42 12s. 3d. per ton.

The May estimate of the 1953 season's crop indicated that some 9,044,000 tons of cane would be available. The dry winter caused cane estimates to be revised downwards by some 5 per cent. and it is now expected that the crop will be approximately 8,600,000 tons, yielding about 1,235,000 tons of 94 n.t. sugar. The value of this crop to Queensland will be about £50,000,000.

This steep production rise over 1952 is the result of a generally good season in all sugar districts, plus the increased acreage coming into production as a result of the expansion programme, the area estimated for harvest having jumped to 340,000 acres. Thus in the first year of the operation of the new Commonwealth Sugar Agreement Australia will not only meet her own commitments but will also be able to assist in making up the shortfalls of other Commonwealth exporters.

The Sugar Inquiry Committee appointed by the Commonwealth Government, and of which the writer was a member, presented its report in September, 1952. After consideration of the report the Government increased the retail price of refined domestic consumption sugar to 9d. per lb., the wholesale refined price being £73 16s. 4d. per ton.

Following discussions with the United Kingdom Ministry of Food in November, 1952, the price of the 314,000 tons of negotiated-price export sugar was increased from £38 10s. 0d. sterling to £42 6s. 8d. sterling. The remainder of the export sugar will be sold on the United Kingdom and Canadian markets at ruling open market prices plus preferences.

The Queensland sugar industry has done a remarkable job in so quickly expanding production to meet the needs of the export quotas negotiated with the United Kingdom. In the meantime a new problem has arisen in that local consumption has not risen as anticipated with increasing population but has actually declined. It is now expected that local consumption of the 1953 crop will certainly not be more than 500,000 tons, compared with the record of 587,745 tons in 1951.

TOBACCO.

It has long been anticipated that in the agricultural development of North Queensland in particular, tobacco would play a most important role as a cash crop. Development authorities are consequently as perturbed as growers at the unstable marketing conditions which prevailed during the 1952-53 selling season and at the inability of the various parties to agree on a stabilisation technique in subsequent discussions.

A good clearance of all usable leaf at the 1951 sales at an average price of 105.23d. per lb. gave a feeling of buoyancy to the industry, and it was with consternation that growers saw the price of leaf fall considerably at the 1952 sales and about a quarter of the crop remain unsold.

The manufacturers claimed that they had no use for the leaf that was not bought, while the growers declared it was usable. A Commonwealth special committee having confirmed that most of it was usable, the Commonwealth Government made monetary advances pending subsequent sale and also increased the percentages of local leaf that had to be bought by manufacturers in order to qualify for tariff rebates on imported leaf. Simple arithmetic shows, however, that much larger percentages are needed to give proper effect to the Government's policy.

For some months past endeavours have been made to evolve a satisfactory basis for the disposal of Queensland leaf. Conferences held between the manufacturers, the Tobacco Leaf Marketing Board, and Commonwealth and State authorities have so far proved abortive, and the 1953 sales started with growers in a not much more favourable position than they were in 1952.

The position needs to be resolved fairly quickly if the confidence of present growers in the stability of the industry is not to be lost. It is extremely important to North Queensland in particular that tobacco growing flourish and expand as irrigation schemes now under way come into operation. It is hoped that a survey of the industry about to be undertaken by the Commonwealth Bureau of Agricultural Economics will point the way to an assured future.

Two properties for the establishment of permanent tobacco experiment stations have now been acquired, in the Mareeba-Dimbulah and Inglewood districts, respectively. The latter is a developed property and will shortly be in full operation.

THE IMPROVEMENT OF QUALITY.

One of the important activities of the Department is research devoted to the gradual improvement in the quality of the varieties of plants grown commercially and of the produce despatched to market. In this is required closely integrated team work, commencing with the plant breeders and later combining the efforts of pathologists, entomologists, physiologists, and chemists.

The plant breeder requires a great deal more than mere academic training in genetics; he must have years of experience of the crop and of the climatic and soil conditions for which he is breeding; and he must also develop that subtle indefinable sixth sense which enables him to separate the good and the bad at an early stage.

The Department has now six trained plant breeders devoting their attention to the breeding of new varieties of crop plant or (what is often more important) selecting and fixing strains within commercial varieties. The breeding of new varieties is now actively being carried out in wheat, oats, sorghum, Sudan grass, pumpkins, cowpeas, papaws, strawberries, tomatoes, and beans; production of hybrid maize is carried on in association with Gatton College. Selection of strains within existing varieties is being actively pursued in linseed, cotton, peanuts, tobacco, citrus, avocadoes, pineapples and tomatoes. In addition there are conducted hundreds of trials with new varieties of crop plants obtained from overseas or from other States.

The leading agricultural industries—sugar and wheat—are based mainly on Queensland-bred varieties; grain sorghum, oats, and maize are rapidly changing to locally produced types. Departmental plant breeders have now developed a new Sudan grass, low in prussic acid, which will shortly be available for commercial planting. Since prussic acid poisoning of stock has been the chief deterrent to grazing of this otherwise excellent grass this new development is highly important. Yields of tomatoes, beans, papaws, citrus, pineapples, peanuts and other crops have been and continue to be improved or standardised by the use of Departmentally produced strains.

Uniformity of product is of particular importance in the fruit and vegetable industry. A cannery, for example, requires pineapples which are uniform in size so as to be treated without undue waste by standardised machinery, and the pineapple industry is being gradually changed over to crops grown from selected and standardised pedigreed stock. Tomato varieties producing more uniform fruit and doubling the yield of old varieties have been produced for the Stanthorpe and other districts.

The maintenance of varieties true to type is obviously of very great importance and requires constant vigilance. To this end we some years ago instituted a service where seed is produced under official supervision; this service is now

being applied on a larger scale to wheat, grain sorghum, sweet sorghum, maize, tobacco, cowpeas, beans, citrus (budwood), pineapples (suckers), and tomatoes.

Quality of produce of a particular variety is affected by pests and diseases, time of picking, and the method of packing. The quick-maturing tropical fruits are particularly susceptible to blemishes and lack of flavour due to immature harvest.

Researches over recent years have gone a long way towards making possible the elimination of loss from storage diseases or insect attack with grains, ground crops such as potatoes and onions, citrus, and apples, all of which are normally stored over long periods. Cold storage methods with and without gas treatment have also been developed with precision for both refrigerated transport and storage.

Among researches recently carried out or in progress with tropical fruits may be mentioned: The dipping of pineapples in sodium salicylanilide before packing to control water blister; enclosing maturing pineapples in plastic bags for the control of black heart; and the use of plastic wrappers to maintain fresh appearance in long distance transport and storage. Covering of banana bunches can increase weight, hasten maturity, and improve appearance; in current experiments red plastic covers have given greatest increase in weight and blue covers greatest acceleration in ripening. Coating of bananas with wax emulsions has reduced weight loss and improved appearance during ripening; several new chemicals of the hormone type show promise as ripening agents. Dipping citrus in wax emulsions impregnated with fungicides has reduced storage losses markedly. Artificial colouring and softening of papaws is now standard commercial practice but green-picked fruit never attains true flavour; experiments are now in progress to test the possibility of injecting volatile and aromatic substances to influence flavour.

A very considerable amount of work has been carried out, and results are available to the trade, on methods of quick-freezing and thawing out, as well as the relative suitability of different varieties for quick-freezing. This process preserves natural flavours much better than canning but requires high-quality produce for treatment.

Packing and grading are highly important factors in the marketing of good-quality fruit and vegetables in an attractive manner. Standards of packing and grading deteriorated during the war and immediate post-war period but a more stable industry, greater consumer discrimination, and stricter regulations are influencing an improvement. Individual and collective instruction on packing is available to growers on request. Realising that young training is best, fruit-packing classes are conducted with the co-operation of the Department of Public Instruction; interest in these classes has been stimulated in the Granite Belt and the near North Coast by the award of Shields by the Deciduous Fruit Sectional Group Committee and the *Brisbane Telegraph* respectively.

During the year new regulations were gazetted prescribing standards of quality and maturity for the more important fruits and vegetables, and also making stricter provisions for packing, grading, and labelling. Stanthorpe growers are to be commended upon the appointment of a growers' committee to stimulate improved marketing methods.

EXTENSION SERVICES.

A Department of Agriculture has two complementary responsibilities: firstly to resolve the production problems confronting the primary producer and secondly to place the results of researches and practical recommendations before him in adequate and suitable form. There is of course a third obligation—that the primary producer have the will to utilise these findings in an effort to attain ever greater efficiency.

Owing to its great distances and scattered population the problems of extension, or educational, services are accentuated in Australia and this is particularly so in Queensland with its added great diversity of climate and cropping. The provision of extension services comparable with those of the populous United States is not feasible; nevertheless the spectacular increases in the productive capacity of the United States during the past decade have clearly demonstrated the value of an adequate extension service.

The interest of the Commonwealth in extension services as an aid to production is evidenced by the two monetary grants now being made for this purpose. For the five-year period commencing July 1st, 1948, the Commonwealth made available annually a sum of £250,000 for the promotion of efficiency in the dairy industry. This grant has now been renewed for a further period of five years on substantially the same conditions, Queensland's share being £65,836 annually. The scheme has been generally successful and has greatly stimulated interest in such important practices as herd recording, sown pastures, sub-divisional fencing, and calf feeding. Obviously the effective value of the £250,000 is now far below that of 1948; this has necessitated curtailment of activities, while some projects have been modified to conform with changing conditions.

Last year the Commonwealth announced a grant of £200,000 per annum (of which Queensland's share is £38,000) for extension work in industries other than dairying and wool. It was further announced that if satisfied with State and industry contributions to expanded technical services the Commonwealth might increase this grant to £300,000 for 1953-54 and to £500,000 for the remaining three years of the term. Well-supported submissions that Queensland, at least, had already met these conditions have been made but the decision of the Commonwealth is not yet known.

Financial assistance in this important sphere is very welcome but a more permanent basis is most desirable. Under the present conditions of the grants the States are obliged to employ an increasing proportion of "temporary" employees—a circumstance which is certainly not in the best interests of efficiency.

In recent years the Department has conducted regular "refresher" courses for the field advisory officers of the various Branches. By

means of these courses not only are the field officers instructed in recent advances in agricultural technology, but the point of view and problems of the field men are placed before the research workers. It can be stated that the average field adviser is much better equipped technically than he was a decade ago.

Emphasis has been placed on field days, of which 68 were held in all parts of the State during the year. A Horticulture Branch innovation of promise has been the holding of five farmers' schools lasting several days, and the organisation of farmers' tours of experimental plots and model farms. Press and radio have been used to an increasing extent and there are now available on application over 300 separate bulletins and pamphlets on a very wide range of subjects.

Agricultural extension work is becoming increasingly important and complex and it is evident that some specialised direction of extension methods and training is necessary. In the United States it is accepted practice for administrative heads of agricultural institutions to have three top assistants—technical, finance-administration, and extension.

To date we have not been able to give formal training in extension methods and practice to our young field advisers, nor have we had a specialist who could formulate overall plans, not the least important of which is the stimulation of rural community interest. The problems of extension were recently discussed by a special committee set up by the Australian Agricultural Council and the several State Departments of Agriculture are now examining the proposals.

As indicated in the first paragraph of this sub-section, responsibility for the success of extension services does not rest solely upon the Department of Agriculture. The best technical and extension services have little value if industry has not the receptivity and the will to use them. The inculcation of this attitude is very largely a matter for the leaders of industry; there is a great disparity between particular industries in this respect.

In April, 1952, the Australian Agricultural Council revived wartime practice and promulgated a series of Commonwealth and State production targets for the next five years. Although strongly criticised in uninformed quarters with hackneyed phrases these targets have proved very useful in guiding extension services and influencing production or import of material and mechanical requirements.

OVERSEAS INVESTIGATIONS.

Several officers departed for or returned from visits overseas. It is a distinct tribute to the Department that in each case the main funds were provided from extra-Departmental sources; in three cases, however, special grants were made to provide for specific investigations, while the State Government also paid salaries.

Mr. G. R. Moule, Director of Sheep Husbandry, returned from a four months' visit to the United States under a "Leader and Specialist Grant" from the United States Government. Mr. Moule made a specialised study of extension methods. Mr. S. L. Everist, Botanist, attended the International Grasslands Congress in the United States in August, 1952, as a Commonwealth Representative and later visited Great Britain and Holland on behalf of the Department; the information gained is being put to good use in the present drive on pasture improvement. Mr. R. C. Cannon, Senior Horticulturist, visited Hawaii early in the year on behalf of the Pineapple Sectional Group Committee. Mr. Cannon studied tropical fruit production with special reference to pineapples, the cultivation of which has been developed to a high degree in Hawaii.

Messrs. A. L. Clay, Assistant Director of the Division of Animal Industry, and L. E. Nichols, Director of Dairy Research, are still abroad. Mr. Clay attended the International Veterinary Congress in Stockholm as a Commonwealth representative and is now making post-conference visits in Europe and the United States on behalf of the Department; he will pay particular attention to feeding of dairy cattle, and pig and poultry production. Mr. Nichols attended the International Dairy Congress at The Hague and is now visiting Great Britain and other Western European countries and the United States. Funds for this purpose were provided from the Commonwealth Dairy Efficiency Grant. Mr. Nichols will specialise in dairy products manufacture and alternative forms of marketing of milk and milk products.

Mr. S. L. Everist also visited New Caledonia and Fiji at the request of the South Pacific Commission in order to report upon pasture problems and improvement.

It will be seen from the foregoing that a very representative coverage is being made and should result in keeping the Department fully abreast of world developments.

CROP AND PRICE REPORTING.

Prominent among the post-war plans for the development of the Department was the formation of a crop prospect and price reporting service within the Division of Marketing.

Many organisations—merchandising, finance, transport—and the farmers themselves have a direct and immediate interest in anticipated acreages and yields of animal and plant crops. Business and transport authorities must prepare accordingly for all the services incidental to these crops, while the farmer is influenced as to time and rate of marketing and whether he will expand or contract his plantings.

Crop reporting and forecasting is made additionally difficult by the seasonal vagaries and great size of Queensland; the job would obviously be much easier in England. Nevertheless it can now be said that crop reporting and forecasting is standing the test of time and in all circumstances, has achieved a good standard of accuracy.

The crop reports are of two types—the general monthly trend report covering all crops, and the more detailed progress report and crop forecasts for individual crops. At the present time these special reports cover wheat, barley, maize, grain sorghum, peanuts, tobacco, potatoes, eggs, and poultry meat. The reports are based on the individual reports of over 700 farmers who act as honorary crop correspondents and periodically report the crop status in their immediate districts.

The reporting and recording methods are being refined in the light of experience and will be extended to other crops as opportunity permits.

The daily market price reporting service is based on observers stationed in the fruit, vegetable, and farm produce markets. Their reports are given full and early publicity by radio and press, thus placing in the hands of the farmer impartial and up-to-the-minute advice on prices and enabling him to market accordingly. These price reports are also used by large institutions in keeping a check on victualling contracts.

During the past year the data collected during the five years of price reporting have been analysed and reports are being issued on the seasonal pattern and trends of prices over these years. A knowledge of this seasonal pattern can be used with great advantage by farmers in planning their planting programmes.

THE NEED FOR VIGILANCE.

It has been truly said that "Nature never takes a holiday."

No country's agricultural services can afford to become so engrossed in current problems that they are oblivious to the constant threat presented by a steadily working Nature. The spread of pests and diseases is an example of this threat. Although elaborate quarantine precautions are taken, and are on the whole very effective, serious diseases and pests do slip through the net; it is manifestly impossible to prevent all contravention of regulations by the travelling public or to exclude all risky imports. Consequently there is need for continuous vigilance within the State's boundaries as well as on its borders.

Four new records of undesirable importation were made during the year: Take-all disease of wheat, which has for many years exacted a toll in the wheat-growing areas of southern Australia and other countries, was discovered in Queensland. It is not widespread and should be kept under control if fertility levels are properly maintained. The European house-borer was found in a consignment of imported pre-fabricated houses. Two new weed pests, sneezeweed and honey mesquite, were reported. The single outbreak of the former has been eradicated; in the U.S.A. it is poisonous and gives a taint to milk. Honey mesquite is a serious pest on the grazing lands of south-west United States and it has been recommended to the Co-ordinating Board that the two outbreaks be eradicated by poisoning.

The development of "resistant strains" of parasites is another challenge to continuous vigilance. The existence here of an arsenic-resistant cattle tick was discovered early in the last decade and there are now indications of the existence of new strains which are tolerant of BHC and other chlorinated hydrocarbons. Strains of flies resistant to DDT are well known; and so on. The fight is never over and research must not only keep one step ahead of man's enemies—it must be prepared to sidestep also.

A problem may also be presented by changing practices. For example, the complacency bred of familiarity, high infestation by loopers, and in some cases the introduction of power spraying, in the tobacco field resulted in higher residues of arsenic being left on the leaves. This problem caused a considerable disturbance in the marketing of tobacco leaf last year but, fortunately, a solution appears to hand in the use of the new insecticide, dieldrin.

The achievements of applied entomology have been so spectacular in the past decade that there is a tendency to relax and assume that the chemists and entomologists between them will find the solution to any pest problem. There is no justification for such optimism; we must not expect that the counter to new strains of parasites will always be just round the corner.

An interesting field of research in its very early stages is aimed at the control of external parasites by injections into the blood stream of animals or sap of plants instead of control by dipping, dusting, or spraying. Research workers in the United States claim some success in the control of ticks, lice, and flies in cattle by injection of substances such as dieldrin. In the Nambour district a considerable degree of control of the citrus gall wasp was effected by injection into the tree but the insecticide, which is poisonous to mammals, was translocated to the fruit, rendering it unfit for human consumption.

The development of these so-called systemic insecticides could be very important to the scattered and nomadic cattle industry of Queensland where control of ticks and buffalo fly is determined by the difficulties of mustering and droving. It would obviously be a stupendous step if cattle could be injected with a stable insecticide at branding time. The results of current research will shortly be investigated in the United States by Mr. Clay.

ACKNOWLEDGEMENTS.

Acknowledgement is gratefully made of the assistance and many courtesies received from other Government Departments, both Commonwealth and State, the Commonwealth Scientific and Industrial Research Organization, the Australian Meat Board, producers' organisations, and Radio and Press. Our thanks are due to the Commodity Boards for their continued cooperation, particularly in the supply of statistics. Special mention should be made of the valuable services rendered by the small army of Honorary Crop Correspondents who make possible the valuable periodic crop reports and forecasts.

The staff have generally performed their duties courteously and conscientiously and I am personally much indebted to the Assistant Under Secretaries, the Divisional heads, and the central administrative staff.

Yours faithfully,

Under Secretary.

15th September, 1953.

DIVISIONAL DIRECTORS' REPORTS.

DIVISION OF PLANT INDUSTRY.

Director: Dr. W. A. T. Summerville.

Whilst the nature and volume of primary products of any place are in some degree a reflection of the prevailing climatic conditions, this does not mean that the producer has at all times to accept every vagary of the weather as something which he is impotent to combat or utilise beyond mere acceptance.

In many respects it is the ability to overcome handicaps imposed by unfavourable weather, or alternatively, to use to the limit favourable conditions, which is the best measure of general farming efficiency. In practice those are not alternatives but in large measure inseparable and reciprocal.

Admittedly there are some conditions about which the average farmer can do nothing. For example, if planting rains do not fall the most efficient wheat farmer can have all his efforts to raise a wheat crop completely frustrated. Such misfortunes will occur from time to time, but unless they are infrequent then the growing of wheat in that particular area is unsound farming, anyway.

Apart from the loss of production which follows this type of ill-fortune and which can only be regretted, there is in this State enormous loss of production almost every year when the seasons are quite normal. Whilst variability is a characteristic of our rainfall, it is in amount that the variation occurs rather than in the seasonal incidence. Every farmer knows that he cannot count on effective spring rains, that the winter will be comparatively dry, and the late summer in all probability wet. Further, every man with any experience in animal husbandry knows that most of our pastures lose much of their nutritive value in the winter and are comparatively poor feed until rain causes a flush of new growth in the late spring or more likely in the summer. The great majority of, if not all, producers in the State do not require to be lectured on such simple and largely self-evident facts. And yet year after year the production shows seasonal variations which are clearly a direct reflex of the weather of the previous few weeks; the amount of effective insurance against harsh conditions is very small compared with the action taken in other countries.

Information received indicates that during the past 12 months only 11 new silos have been built, and for the last full year little more than 5,000 tons of silage was made in the State of Queensland. There was a carry-over of about 1,000 tons from the previous year, so we then had about sufficient to feed half the milking cows in the State for one day on a supplementary basis. This is at a time when our total area under lucerne is 5,000 acres less than five years previously. Fortunately, there has been a definite and widespread move towards production of improved pastures, and the services of the Department's agrostologists have been in keen demand.

PASTURE INVESTIGATIONS.

In conformity with the conviction that pasture is fundamental to our whole economy, the Division of Plant Industry has taken every opportunity to further investigations on grasses and fodder legumes. The response from the industry has been gratifying, and as reported by the Director of Agriculture, 93 co-operating dairyfarmers now assist with some 110 pasture trials, and the Australian Dairy Produce Board has continued its valuable assistance. These trials cover virtually all phases, notably introduction of new species, searching for superior strains of common species, investigations of soil amendments using both major and trace elements, and management of sown pastures.

In addition to this type of trial, much of the work of Regional Experiment Stations is built on the basis of either a pasture phase in crop production or the betterment of the animal consequent on improved pastures. There is still much to be learned, but the pattern of what can be anticipated is clear, and in every region the standard of pasture management is obviously reflected in the overall farming results.

Besides the work on dairy and mixed farms, that on beef cattle pastures has also been continued. At Ayr the irrigated para grass + centro and Guinea grass + stylo pastures have now settled down and are demonstrating their ability to carry beef stock at a rate which makes them at least comparable with the best pastures reported from any country. This story is not complete, since we have still to show how such pastures may be most quickly established and given maximum effective life.

The South Johnstone work is similar except that in that district rainfall is relied upon. Details are given in the reports by the Director of Agriculture and the Director of Regional Experiment Stations, but briefly the non-irrigated pastures appear capable of supporting a beast to one acre, and the irrigated double that rate. On the former the bullocks fattened at the rate of better than 1½ lb. daily, and on the latter the evidence is that the gain will be not less than 2 lb. daily.

Officers of the Agriculture Branch have worked in close co-operation with the Bureau of Investigation of Land and Water Resources in the research work on irrigated pastures at the Gatton and Theodore Irrigation Stations. Here again results have been most satisfactory, the most notable result being the production of about 960 lb. of butterfat per acre over the whole 273 days' lactation period of the herd under trial.

In addition to the continuance of the more commonly employed techniques for pasture improvement, Divisional officers have been associated with officers of the Division of Animal Industry in a move towards increasing the conservation of bush hay. It may be recalled that the Report for the year 1951-52 recorded the successful baling of native grasses at McKinlay. This success has encouraged others to follow and the Department is actively fostering the venture. Details of this will be found in the report of the Division of Animal Industry. It is sufficient here to note that the agrostologists are interested not only in the direct results of the work but in the subsequent history of mown pastures, since it is known that natural pastures sometimes deteriorate rather badly if cut at certain times of the year.

With respect to beef cattle pastures, progress has been made with the setting up of "Brian Pastures" Research Station, the initiation of which, in conjunction with the Australian Meat Board and C.S.I.R.O., was reported last year. During the period under review, details of a long programme of investigations were worked out, soil survey work completed, subdivision planned and fencing commenced. Cattle are now being depastured on the property and work is proceeding on the provision of basic facilities. Until housing, subdivisional fencing and stock-weighing facilities are complete, research work cannot be commenced, but in the meantime necessary preliminary observations and botanical survey work have been done. The botanical survey work has revealed that there is a good representation of all the major native species of particular interest, and it is noteworthy that in one section of the property the composition of the sward represents a natural climax, so the work will not be complicated in that part by any effects of previous management.

BURDEKIN PROJECT INVESTIGATIONS.

In association with, and partly financed by, the Burdekin River Authority, the Department has continued investigations into the matter of land use of major soil groups of the Burdekin Valley Irrigation Area. The soil survey party completed the mapping of the Millaroo section, and the field work on the Dalbeg portion will be finalised within about two months. The mapping of these two areas will enable the Irrigation and Water Supply Commission to proceed with farm design and location of supply channels and the like.

Further contributions to our overall knowledge of crop behaviour in the region have been made from Ayr Regional Experiment Station, the Clare Tobacco Station and the Clare Pilot Plots. The work on the pilot plots is of particular value, since here the soils under investigation are the heavier flood plain types about which comparatively little was known. Both crop and pasture species have been sown, the latter being well enough established to permit of some grazing towards the end of summer and in the autumn of this year. Para grass, Guinea grass, centro, and especially stylo, have shown considerable promise and there is now no doubt that productive balanced pastures can be established on these Burdekin soils. One of the most interesting developments is the improvement in native pastures by the introduction of stylo, which has shown considerable potential for spreading in even the roughest native pastures. Of these types, Oaky soils are less amenable to known techniques than are the Barrattas, and further intensive study of the shallower-phase types is required.

Probably the most important problem to be solved is that associated with ensuring maximum effective penetration of irrigation water. With the Barrattas it is felt that the problem is easily solved, but the shallow-phase Oaky type will be more difficult. Soil physics has thus become a most important part of the Division's work in the Valley.

Of the crops, oats, wheat, sunflower, sugarcane and the sorghums have varied from satisfactory to very good, cotton has been very variable, and lucerne has so far been scarcely better than a failure. It is not visualised that the flood plain will be developed for cropping, but it is probable that oats and perhaps other cereals and sunflowers may have an important place in conditioning land for subsequent permanent pastures.

SOIL CONSERVATION.

The total area of land protected from accelerated erosion by structures such as pondage banks, contour banks, and constructed waterways under the guidance of Departmental officers increased to 40,000 acres during the year. It will be noted from the report of the Director of Agriculture that there has been a marked change in the general attitude of farmers towards crop rotations and stubble-mulch farming. This is one of the most pleasing developments, and the change from the old destructive method of burning crop residues to their conservation for soil structure improvement represents a most important advance in farming methods.

The Soil Conservation Act is now in operation, with good results. The legislative provision of facilities for co-operation between all interested bodies has already given worthwhile results and has provided the basis for catchment area planning, which is by far the most satisfactory way of tackling many of the major erosion problems in the State.

EXTENSION WORK.

In reports of this nature it is usual to concentrate on developments engendered by discoveries either through experiment or experience. Unfortunately, mere discovery does not mean adoption and commonly there is call for much reiteration of both technique and its advantages before farmers can be persuaded to embrace changes. This is the part played by extension officers and calls for both knowledge and patience.

It is generally recognised that there is apt to be a considerable time lag, perhaps of several years, between obtaining a research result and its widespread practice by the primary producer, except in cases when economic necessity is a factor. This is often portrayed in the differences between the returns obtained by progressive farmers and the average for the State. It might perhaps be as well to point out that

Plate 1.—Elephant Grass Trial Plots, Biloela Regional Experiment Station.

Plate 2.—Buffel Grass (Type D), Biloela Regional Experiment Station.

Plate 3.—Stylo (An Introduced Legume) Invading Blady Grass in the Cape York Peninsula.

Plate 4.—Green Panic Grass Harvested with a Reaper and Binder and Stooked Prior to Threshing for Seed.

Queensland farmers are at least no more conservative in adopting innovations than those of any other land, and with a comparatively small number of extension workers and large areas to be covered it is difficult to maintain the desired degree of personal contact.

In recognition of the fact that many of the findings of research have not been adopted by a large proportion of producers and at the same time that greater food production is essential, the Commonwealth Government has made funds available to increase and intensify extension services. Insofar as the Division of Plant Industry is concerned, this has led to the appointment of eight temporary officers, each of whom has been placed so as to release an experienced permanent officer for extension work. The arrangements seem to be satisfactory, but as the earliest adjustment has been completed less than six months it would be preferable to reserve judgment for a little time yet.

RESEARCH AND INVESTIGATIONAL WORK.

Exclusive of special work such as that on the Burdekin project, agrostological demonstrations and the long-term work of Regional Experiment Stations, officers of the Division at the end of this year were actively pursuing work on 296 field experiments of appreciable magnitude. These plots were spread over some 210 localities. They cover plant breeding and improvement by selection, varietal trials, trace element tests, soil management, disease and pest control, weed control and problems arising out of marketing, and apart from weeds and grasses deal with 43 different crop species. Some types of experiments, such as fruit-fly control and soil management, are of course concerned with a large range of plants.

The principal results insofar as crops are concerned are dealt with in some detail in the Reports by the Directors of Regional Experiment Stations, Agriculture, and Horticulture.

Cereals.

Wheat acreage is rapidly expanding and last year more than 700,000 acres were sown, giving a yield of over 18 million bushels. Taking into consideration losses due to frost injury and the inexperience of some new growers in less favoured areas, this is a very satisfactory performance. Its betterment or even maintenance will call for continued research in which agronomists, soil technologists, plant breeders and cereals chemists will all be required to participate. The Division is building up the experience of such a team and progress can be reported. However, some of the problems are complex and on the evidence so far obtained much painstaking effort will be needed.

Effort alone, however, will not suffice in this case and special facilities will have to be provided unless the work is to be far too protracted. The ultimate test of successful wheat growing is in the quality as well as the quantity of flour produced, and the testing of flour quality calls for special apparatus. Further, on account of the nature of the chemical work, special housing is required, and it is most difficult to avoid destructive contamination when the cereals laboratory is open to pollution from adjoining laboratories. This problem must be faced in the near future, and in considering it cognisance no doubt will be taken of the fact that not only growers but millers and bakers are deeply interested, as is also, though from a rather different angle, the general public.

Mottled grain continues to disturb all those interested in producing and using wheat. Our officers are continuing their studies but there is nothing of positive value to report from the work of last season. This does not mean no progress but it does mean no finality.

It is pleasing to report the continued highly satisfactory results from the Department-bred Lawrence, and that the latest release, Spica, continues to substantiate its early promise.

Extension of wheat growing to lower rainfall areas places emphasis on the conservation of summer rain as soil moisture, and it is fortunate that the Department, by virtue of the long-range planning of Biloela Regional Experiment Station, has more than 20 years of carefully designed experiments covering this subject. It is intended to publish the results and an analysis in the near future. This will show just what correct timing of farm operations can mean in an unreliable climatic zone.

Victoria blight made its appearance for the first time in oats in Queensland. Once again the plant breeder has been active in overcoming the trouble, which has caused severe losses. A new hybrid, resistant to the disease, is now being multiplied for distribution.

Linseed production will obviously be governed largely by the relative values of this crop and wheat. If they are comparable, linseed will no doubt hold its own or increase on the lighter soils of the Darling Downs. It is most desirable that this comparatively new crop should prosper, since it can be a valuable source of supply of protein for animal food, and Queensland is notably short of such animal food.

Cotton.

The guarantee of a payable price for seed cotton is now showing effects and farmers in the Central district are responding to the surety. This is a pleasing move, not only because we should produce more cotton but because the inclusion of cotton in the farm rotation in such areas as the Callide and Dawson is sound practice which will have beneficial repercussions on other phases of production.

Potatoes.

The potato is one of the most difficult crops to assess from the point of view of farmer and State. Last year good yields in almost all districts resulted in fluctuating prices and unavoidable restrictions on harvesting. From the consumers' point of view the good yields could be very welcome, at least initially. However, when those good yields are responsible for restriction of harvesting and marketing, the farmer inevitably feels frustrated and is apt to restrict his plantings to a degree which may react against the consumer in the long run. Potatoes are costly to produce and growers are naturally averse to risking the comparatively large outlay required when the more successful their efforts the greater the possibility of marketing troubles.

Plate 5.—Constructing a Wedge Silo of Grass with a Light Tractor and a Buckrake, Kairi Regional Experiment Station.

Plate 6.—Excavating a Trench Silo of a Capacity of About 140 Tons on a Central Queensland Property.

Plate 7.—The Johns Leveller, a Useful Implement for Levelling Land for Irrigation, is Shown Here Moving Soil Across a Bay for Correction of Side Fall.

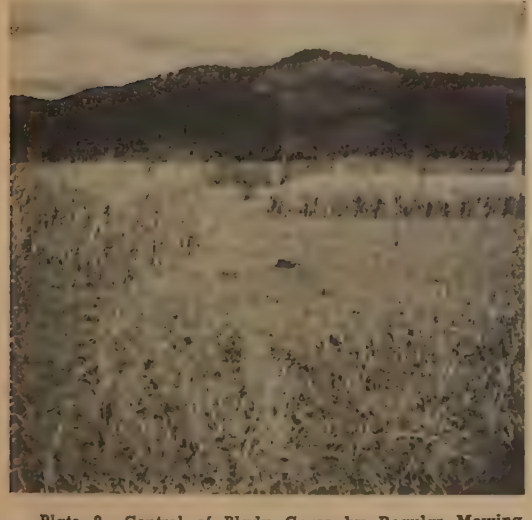


Plate 8.—Control of Blady Grass by Regular Mowing. The plot in the centre was mown monthly, that nearest the camera quarterly. The last mowing was made nine months previously.

Plate 9.—Virgin Brigalow Scrub Two Years After Aerial Spraying with 2 lb. Mixed Esters of 2,4-D and 2,4,5-T Per Acre. Note the vigorous growth of grass which followed the death of the trees.

Tobacco.

Tobacco growers generally have had an unsatisfactory year. Insofar as the problems are related to production it is clear that if the industry is to prosper it can only be on the basis of quality. Growers must recognise this and also that quality can be affected at virtually every stage of the growing, storing and curing. It is indeed a difficult crop, but there are so many men in the industry and in each major district producing high-grade leaf that is is apparent that the remedies for quality defects lie largely within the growers' reach.

Insect pests have caused considerable worry because of both their damage to the plant and the ill effects of spray residues. It is confidently expected that investigations now in hand by the entomologists will ease the pest and residue position greatly. It now seems that the new insecticide dieldrin may be used as a replacement for arsenate of lead and thus eliminate undesirable residues if correctly applied.

Yields generally were good and quality an improvement on the previous year. This can be maintained if growers will rotate crops, fertilize wisely, grow the right variety, and cure carefully. For each of these operations the information is available.

Pineapples.

Pineapple production continues to be outstandingly our leading fruit industry. A record crop is anticipated this year, when more than 2,000,000 cases are expected. The industry is soundly based, but as it depends largely on its ability to sell overseas, efficiency in all phases of production is essential. Pineapple growers must therefore strive to lower their production costs. Fortunately, the will to do so is present and growers generally give evidence of fully realising the position. It is, of course, not always easy to do the correct thing. For example, there are some fields on unsuitable soil and in unsuitable locations, but growers cannot simply move off to another area. Careful selection of site and soil is of paramount importance and this is being more fully realised in new areas than was formerly the case. Where adequate care in this initial stage is coupled with selection of planting material of good type, the prospects of success are very good for both quantity and quality of production. Other troubles, such as disease incidence, will be considerably lessened under such circumstances.

The Horticulture Branch is carrying out a comprehensive programme of investigations into cultural aspects, whilst the Soil Conservation Section and the Science Branch are also actively engaged on problems confronting the pineapple growers. During the year the Senior Horticulturist (Plantation Crops) visited the Territory of Hawaii to study the most recent advances in pineapple production methods. The trip was made at the request of and with financial assistance from the Committee of Direction of Fruit Marketing. Particular attention was paid to "wilt" diseases and it is believed that much worthwhile information was obtained. That information is, however, in the nature of clues for further investigational work rather than direct answers to our local questions.

Other Fruits.

Both the Horticulture and Science Branches are actively engaged on investigational work with all major fruit crops of the State. In addition, considerable attention has been devoted, particularly on cultural problems, to species such as the Macadamia or Queensland nut and the avocado, which, though relatively unimportant as yet, are believed to have good prospects of developing greater importance.

The Macadamia nut, though native to the southern coastal areas of the State, has not been developed commercially to any marked extent. This is in contrast to the success which has attended its cultivation in the Hawaiian Islands. The nut is of excellent quality and finds favour with both confectionery manufacturers and domestic users as a table nut. The reasons for the lack of development in Queensland lie largely in the variability with respect to thickness of shell and the difficulties in vegetative propagation. A survey of available types has shown that excellent material is available and therefore if success follows the work on propagation there seems no reason why nut growing should not become an important industry. Progress has been made and there are reasons for believing that the obstacle presented by the difficulty of budding and grafting can be overcome.

The avocado, too, has been retarded to some extent by the comparatively poor results of propagation, with consequent high price and paucity in numbers of available trees. The adoption, with modifications, of the most recent Californian methods has been attended by much improved results, and in the latest workings over 90 per cent. success was obtained. Adoption of the method by nurserymen will be a big step forward towards building up the avocado industry.

The disease position with respect to bananas is still a matter for concern, though the overall picture shows some improvement. Both bunchy top in the dwarf varieties and Panama disease in the taller types continue to deplete incomes. Constant vigilance is required to keep the situation under control. Our officers are keenly aware of the position and are doing all that can be done, including keeping in constant touch with overseas workers, since both of the troubles cause enormous losses in other countries and are thus subjects of research in all major producing countries where they occur.

Insofar as bananas are concerned, most attention on the cultural side is being devoted to investigations on the physiology of the plant, with the primary objective of obtaining information on planting material, fertilizing and plantation management. All of these have direct bearing on control of fruiting so as to obtain maximum supplies at times when the banana has least competition or for other reasons can be expected to command the best returns. Good progress has been made.

The management of citrus orchards, with particular stress on tillage operations, is an important Horticulture Branch activity, and results of economic importance have been made available to growers through a series of field days and schools for orchardists. Insect pests

Plate 10.—Pineapples Covered with Plastic Covers as a Protection Against Black Heart Damage.

Plate 11.—Portion of Maroochy Experiment Station.

Plate 12.—First Ratoon Crop of Bananas at Maroochy Experiment Station.

Plate 13.—Nematode Resistance in Tomatoes. Top, Q1 tomato plants infested with nematodes. Bottom, Resistant 146, a nematode resistant type grown in the same area.

of this and other fruits have also been investigated. The citrus gall wasp continues to cause losses, and so far, though methods of killing the pest have been devised, no satisfactory method of control for use by the orchardist has been evolved.

Deciduous fruits have also been given a great deal of attention, particularly by pathologists and entomologists. The latter officers have been most active in work aimed at the control of fruit fly. This pest is a menace to a large number of fruit crops in the orchard and in the last few years has become even more important because of the methods adopted to prevent its introduction into other States in marketed fruit. The position of these other States must be appreciated, and the rather drastic provision of inspection of every fruit cannot be condemned, even though its necessity or effectiveness might be doubted. At all events, those provisions are in force and they must react against Queensland fruits consigned interstate. It is therefore important that the work on fruit fly be continued along each of the lines now in hand—namely, correct identification, field control by spraying and hygiene, and market control by fumigation of the packed fruit. In some of this work both C.S.I.R.O. and the New South Wales Department of Agriculture are also actively engaged.

Other fruits on which investigations into improvement, production, preservation or processing are being conducted include papaw, strawberry, mango, fig, and passionfruit.

Vegetables.

Vegetable crops are becoming increasingly important for both human consumption and interstate trade, and accordingly entomological, plant pathological and cultural problems all are receiving much attention. The worth of the Redlands Experiment Station is now very evident. The vegetable work at this Station, at Stanthorpe, and in several other centres is made up of a large series of investigations, details of which are dealt with in the reports of the work of the Horticulture and Science Branches.

Attention might be directed to the results of trace element investigations, varietal trials with cabbages, cauliflowers, beans and tomatoes, breeding work with tomatoes and beans, and weed control problems, particularly in carrot beds.

Probably the most promising result obtained during the period under review was that concerning nematode resistance in tomatoes. The basic plant material supplied by C.S.I.R.O. showed spectacular resistance to the root knot nematode. Whilst most of the strains received will be used as parents, at least one will probably be of direct value to tomato growers.

Tomato growers in this State have benefited, perhaps to a greater extent than any other vegetable growers, from the success of plant breeding activities over the past decade, and the production of good-yielding nematode-resistant varieties will be a further most valuable contribution to this industry.

SOIL SURVEYS.

Officers of the Plant Nutrition Section of the Chemical Laboratory have been continuously engaged on soil survey work. Apart from comparatively small areas comprising only a few thousand acres in each case, the bulk of the work has been connected with irrigation development. In the Burdekin region the levee bank section on the west bank is virtually completed and a little flood plain work has also been done. Further work in the flood plain will not be necessary until dam construction is advanced appreciably, and accordingly resources will be concentrated in the Mareeba-Dimbulah area for the greater part of next year. This is exacting work, but as the information is basic to design not only of the farms but of the supply channels, and to a lesser extent drainage lines, it has been accorded high priority. The progress has been highly satisfactory.

NEW EXPERIMENT STATIONS.

In accordance with the policy of conducting long-term investigations on fully controlled land, the Department has secured three additional areas during the year for the purpose of establishing experiment stations. The first of these is located near Inglewood and will be devoted to work on problems associated with tobacco growing in the south-western tobacco area. In this case a developed farm was purchased and investigational work can commence with the next tobacco season.

In the other two cases undeveloped areas were acquired. In the Burdekin region, an area of some 900 acres has been set aside for use by the Department—the capital costs of establishment are to be met by the Burdekin River Authority. This is virgin country and to date all that has been done is clearing timber from about 150 acres. It is hoped that sufficient buildings will be erected and water supplied to enable a start on plantings to be made during 1953-54. The land is located at Millaroo, some 40 miles upstream from Ayr.

The third area is at Parada, near Dimbulah. Here again the land is under forest and has been secured at this comparatively early date to enable work to be commenced so as to minimise the delay in obtaining results of value to new settlers in the Mareeba-Dimbulah Irrigation Project region. The area is approximately 660 acres and the soils are representative of much of the lands to be irrigated. The primary concern of this Station will be tobacco, but the area acquired and the diversity of soil types were selected with a view to working on other crops and pastures which it is considered will ultimately play an important part in the region. No developmental work on this area has yet been possible, but planning of layout is proceeding.

Including these three areas, the Division of Plant Industry is now operating 13 stations, two of which (one at Clare and one at Mareeba) are temporary and will be discontinued when the new areas are developed.

In addition to the Experiment Stations, the pilot plots on the flood plain soils of the Burdekin cover some 40 acres. These too will be closed when the Millaroo area is developed.

The wallum lands investigations are proceeding near Coolum, where an area of approximately 1,930 acres has been set aside for experimental purposes. The work is progressing on a small part of this holding and further development of greater areas will depend on the results obtained.

SCHOOLS AND CONFERENCES.

During the year, schools for pineapple growers were held at Nambour, Ayr and Innisfail. At Nambour two such schools were conducted, one for junior farmers and one for adults.

Two similar gatherings were held for citrus growers. Each of these was spread over three days and sessions conducted in a number of localities. One moved within the Howard and Gayndah districts and the other in the Metropolitan and Near North Coast areas. Whilst some time is lost in travelling, provided this is kept to a minimum visiting several orchards has many advantages, as it does enable growers to see a variety of conditions which otherwise can only be described and savour too much of theory.

Each of these schools and field days was well attended and growers received the idea with enthusiasm.

Field days have been conducted in practically all agricultural districts where the necessary staff was available and in every case attendances have been large. Those days held on Experiment Stations have been particularly well patronised. In the case of fruit industries, the C.O.D. has given valuable assistance, in some cases taking care of the bulk of the necessary organising.

Two schools for Departmental officers have also been held, one for soil conservation staff, and the other dealing with irrigation practice having particular reference to land preparation for irrigated pastures. Each of these schools was of about a week's duration.

A soil science conference, an irrigation school, a tobacco, and an entomological conference, all of which were organised by Commonwealth bodies, were attended by appropriate officers of the Division of Plant Industry. Each of these provided opportunity for our officers to meet and confer with specialists from C.S.I.R.O. and other State Departments of Agriculture, and the interchange of information and ideas is considered to have been of considerable value.

OVERSEAS VISITS.

Two officers of the Division made journeys abroad for official purposes during the year.

Mr. Everist visited U.S.A., Great Britain and Holland primarily to attend the International Grasslands Congress. He used the opportunity to gather further information on pastures by visits oustide the scope of the Conference, and also on the subject of botanical work generally in the places visited. The expenses of this trip were met mainly from the Commonwealth Dairy Industry Efficiency Grant monies.

Mr. Everist also made a brief visit to New Caledonia and Fiji at the request of the South Pacific Commission, for the purpose of advising that body on pastures in those islands.

At the request of the Pineapple Group Committee of the C.O.D., Mr. R. C. Cannon visited the Hawaiian Islands to enquire into recent advances in pineapple production, with particular reference to disease control. This visit was financed by the Pineapple Sectional Group Committee insofar as expenses were involved. It is felt that the purposes of the trip were fulfilled and worthwhile information was secured.

STAFF.

During the year 42 appointments were made to Divisional staff and 28 officers were lost to the Division. Of these changes one was brought about by the death of an officer, three by transfer to other branches of the service, one by retirement, three by termination of services, and the remaining 20 by resignations. Three approved appointments were not accepted.

By far the greatest number of both losses and gains was in technical staff. Most serious losses were in plant pathology and agronomy. The Senior Plant Pathologist resigned after some 30 years of service, whilst in agronomy serious gaps were caused when well-trained men left positions at Ayr and Warwick. In two cases new appointees were experienced men, the remainder being recent graduates or otherwise inexperienced men.

Whilst there are still serious gaps, the balance as between the various sciences is satisfactory on the research side. The demand for field advisory services is insistent and there is a dearth of suitably trained men available for extension work. The shortage of clerical assistance is also a matter for some concern.

DIVISION OF ANIMAL INDUSTRY.

Director: Mr. W. Webster.

The year 1952-53 has been one of achievement for the Division of Animal Industry and there has been material development of extension services, disease control, and research.

The purchase of land at Rocklea has brought the commencement of husbandry research closer and the completion of buildings at Toorak (Julia Creek) has made special sheep research possible.

The purchase of haymaking equipment for work in the north-western and central areas of the State is the beginning of work which it is hoped will minimise loss of production in the pastoral industries. These demonstrations, carried out in association with the Division of Plant Industry, are being undertaken to encourage stock-owners to conserve fodder in an endeavour both to maintain production and to prevent the loss of valuable breeding stock and their progeny.

With the appointment of a special officer, a survey of the incidence of infertility in dairy cattle has been commenced. This condition is one of the major causes of loss of production in the cattle industry.

The erection of weighbridge-type scales and the measurement of the growth of cattle in different climatic environments of the State is continuing. Together with the regular recording of the grazing habits of cattle in these areas, weighing results are beginning to indicate the responses of cattle to grazing on natural pastures. These results will, it is hoped, indicate what are the deficiencies of natural pasture. The correction of these deficiencies and the economic supplementation of pasture shortages is no doubt a long-range problem. Types of supplementary feeding and the economics of production by these methods are now being examined on the properties of graziers who are interested in this type of work. Scales have also been installed on these properties. Preliminary comparisons of the growth rates of British breeds and Zebu hybrids on a property in North Queensland are also in progress. Scales have been erected by owners to assist in the progeny testing of their bulls and in the feeding of young bulls.

Supplementary feeding of concentrates to dairy cows has proved to be uneconomic except where pasture is sufficient for maintenance and an appreciable production. On the other hand, the feeding of homegrown roughages has been shown to be sound practice. The rearing of calves on limited amounts of wholemilk and various other forms of calf rearing are still being examined, but much useful information has already been obtained.

The development of "Brian Pastures," near Gayndah, as a beef cattle research station is being awaited with keen interest. Already much fencing has been completed and the erection of stockyards, houses, sheds, &c., commenced. The breeding stock has been purchased and the cattle scales will be erected with the yards. When the scales are ready, weighing of cattle from birth to maturity will commence; this will provide basic information on which to plan pasture work.

The expansion of the tuberculin testing scheme has increased the annual tests for this year by more than 100,000 head. Because of this scheme, qualified veterinary surgeons are now in practice in centres all along the coast of Queensland, and the majority of dairy cattle in the south-east of Queensland, the Darling Downs, and the South Burnett are now under test. At the same time there has been an expansion in Departmental veterinary staff in western Queensland.

Special attention has been given to the control of pleuro-pneumonia and steady improvement is being maintained. Similarly, the charging of strategic dips with DDT has done much to decrease tick incidence in travelling cattle and so prevent loss of production.

Research work has been realistic and care has been taken to devote available time to the more urgent problems of the industry. As disease control, extension and diagnostic work, immunisation and other services must be continued, the amount and quality of the research work accomplished by the staff is worthy of great praise. Whilst sound work has been completed at the Animal Health Stations, it must not be forgotten that equally good work has also been carried out by men working in the field.

It is to be expected that staff difficulties have to be overcome when a number of autonomous branches are joined to form a Division. This is accentuated when at the same time staffs are expanding. It is pleasing to observe that there is evidence of a general awareness of the need for teamwork. Individuals are realising that to complete a project with speed and efficiency co-operative work by a group of specialists is advisable. Examples of this team work are quoted in the following summary of research projects.

The disease now known as leptospirosis has for many years been one of the unsolved problems of the dairying industry. The discovery of diagnostic techniques by research workers at the Animal Health Station, Yeerongpilly, has opened the way for further work. This is now being undertaken with the assistance of field staff. Similar joint work is being accomplished with humpy-back in sheep, which has been present in the west for many years, and a solution now appears to be close. In this work, the assistance of the botanist has been invaluable to the research team. Sterility in rams due to infection by a specific organism has been proved as the result of joint work by officers of the Sheep and Wool Branch and research staff at Yeerongpilly. Work on controlling body strike in sheep with insecticides has been carried out by staff from Yeerongpilly and C.S.I.R.O. working together. Similar work with internal parasites has also been undertaken.

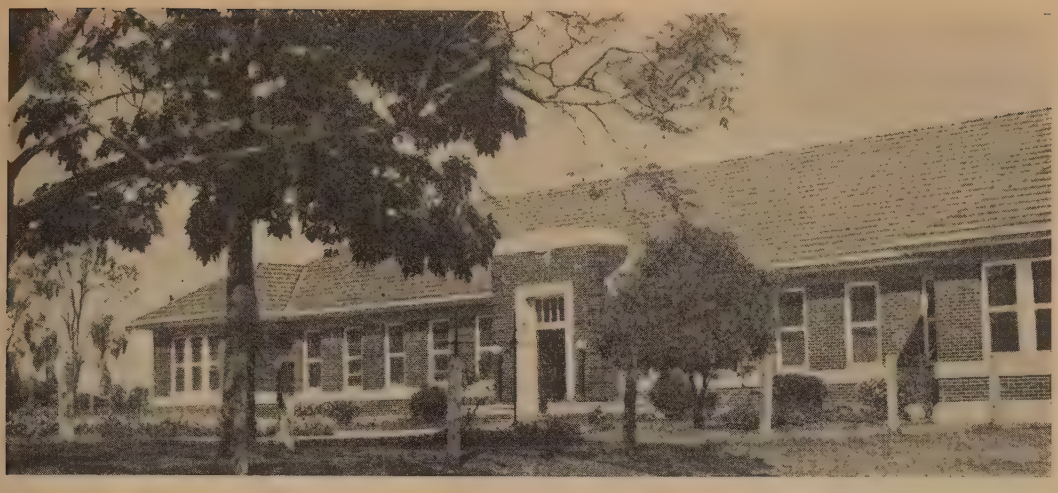


Plate 1.—General View of the Administrative and Main Laboratories Building.

Plate 2.—Collecting a Blood Sample from an Experimental Rabbit.

Plate 3.—Examining Developing Hen Eggs Inoculated with Virus.

Plate 4.—Dosing Experimental Sheep.

Plate 5.—Machine Spreading Stable Manure on Pasture at Yeerongpilly.

One of the most difficult problems attacked has been that of copper deficiency; a team comprising men from the Cattle Husbandry Branch, Chemical Laboratory, Agriculture Branch, and Yeerongpilly Animal Health Station is engaged on the project. A great deal of preliminary survey and pilot work has been carried out on the South Coast and Near North Coast and in other parts of the State.

DISEASE INVESTIGATIONS.

Work has been continued with the synthetic insecticides and some previous observations confirmed. In South Queensland in ordinary years the treatment of dairy cattle in the winter can be greatly reduced if steps are taken to bring the cattle tick under adequate control by the end of the summer. Some experimental work was done at the Animal Health Station, Yeerongpilly, on arsenic-resistant ticks from the quarantine areas of New South Wales, in which it has been shown that, though resistant to arsenic, the tick was susceptible to several of the well-known synthetic insecticides.

Attention was again directed to the common infectious diseases, other than brucellosis, that cause infertility. Vibriosis was diagnosed in a number of herds, while trichomoniasis was diagnosed in a group of herds at Beaudesert. Methods of diagnosis in both diseases were investigated and success was achieved, particularly in bulls, but further improvement in the method is still desired.

Diseases of the wallum country were studied in both South and North Queensland. Feeding experiments showed that the staggers induced by zamia are probably distinct from the nervous disorders referred to by farmers as "wamps." Species of grass-tree are suspected as the cause of "wamps" and some feeding experiments are being undertaken.

Feeding experiments with Crofton weed, which is suspected of causing Tallebudgera horse disease, have been continued, but results up to date have been negative in spite of having fed 2 to 3 tons of the plant.

Lesions resembling tuberculosis which could cause needless condemnation of pigs' heads at abattoirs have been shown to be caused by infection with another bacterium. This infection can be distinguished from tuberculosis by careful inspection.

A survey of the incidence and importance of vitamin A deficiency in fowls is being carried out by analysing livers of birds selected from those submitted to Yeerongpilly for diagnosis for other complaints. It has been found that in young chickens vitamin A deficiency is often the cause of poor growth and high mortality which would be difficult to detect by post-mortem examination alone. A study of the viruses concerned in the common and troublesome respiratory infections of poultry has been undertaken. From two flocks, virus not previously found in Queensland has been isolated by chick embryo inoculation and is now being studied to determine its identity.

SHEEP INVESTIGATIONS.

During the period of drought in north-western Queensland, trials have been conducted on Toorak Field Station to determine how intermittent feeding of sheep could be applied under field conditions. The trial was designed to see if paddock size influenced the overall result. The sheep being fed once a week in a small yard developed scours and had to be removed to a small paddock. Groups fed bi-weekly and weekly in large paddocks had to be mustered onto the feed and difficulties were experienced in ensuring that each sheep consumed an adequate share.

A trial to determine the field application of the feeding of urea as a protein substitute during a time of protein deficiency was conducted on Toorak Field Station by the staff of the Sheep and Wool Branch working with C.S.I.R.O. Results indicated that when the protein content of the pasture is low, as in drought times, the amount of urea consumed is toxic to the sheep fed.

Investigations began at Toorak Field Station in April on the adaptation and tolerance of different strains of Merino sheep to the hot conditions of the tropics. The extent to which fertility can be related to heat tolerance will be studied from the results of the recent hand-mating of the rams with the ewes.

Further observations on the neo-natal mortality of lambs were made on a property in the Longreach district. A lamb-marking percentage of 84 was obtained, the highest for any investigation of this nature at Longreach. However, 24% of all lambs born died before marking. It was found that 4-year-old ewes reared a higher percentage of lambs to marking age than did 2-year-old ewes. Observations were also made on the milk yield of ewes and the weight gains of their lambs over a period of six weeks. The effects of changes in the levels of nutrition of the ewes on milk yields and weight gains of the lambs were also studied.

CATTLE HUSBANDRY.

It has been demonstrated that the quantity and quality of roughage available to cattle had a much greater effect on production than has a small quantity of concentrate. Concentrate feeding has proved of most value on farms where management and roughage feeding have been of a high order, but even at the present prices it has not been profitable with roughages of low quality.

From these results, it is hoped to be able to demonstrate the quality of supplementary roughage needed according to the condition and quality of the pasture. This work will assist the agricultural extension worker and encourage dairy farmers to produce and if necessary conserve high-quality roughages.

Calf-feeding demonstrations have been extended and large numbers of calves have now been raised by various methods. Good results have been obtained on rations containing a maximum of 15 gallons of wholemilk and dry meals. Gruel feeding and the addition of antibiotics to a standard ration have not shown any advantage over standard methods.

Plate 6.—Guernsey Calves Raised on 13 gallons of Wholemilk Plus Meal.

Plate 7.—Guernsey Heifers at 18 Months Raised on 30 Gallons of Wholemilk Plus Meal.

Plate 8.—A Dairy Herd Used for Experiments on Feed Intake. Cows on this pasture were able to obtain in 24 hours only sufficient bulk to produce 13 lb. of milk.

Survey work to determine the areas of Queensland in which clinical manifestations of phosphorus deficiency appear in cattle are being continued. More detailed work on the treatment of this disease is being undertaken in both the beef and dairy cattle industries. In Central Queensland, Hereford heifers given water treated with superphosphate have thrived better than heifers not receiving supplement. A lesser response has been obtained by the administration of phosphate in a bonemeal lick. In the dairying industry phosphate is most easily administered by the addition of bonemeal to the concentrate ration. Excellent results have been obtained from this method in the Gympie district, but a trial in south-eastern Queensland did not give such good results.

It has long been realised that before soundly based extension work in the beef industry could be undertaken it would be necessary to collect data on the growth rates of cattle through the State. With this objective in view, efforts have been made to obtain the co-operation of prominent graziers in routine weighing of cattle. This work has made considerable progress in the last 12 months and scales are being installed or are ready to be installed on nine properties. Excellent information on growth rates of cattle on natural pastures, improved pastures and crops, as well as comparisons of British and Brahman-cross cattle, are now being obtained.

A series of observations on the grazing habits of cattle in the tropics has been carried out at the Bureau of Tropical Agriculture, South Johnstone, and at Ayr Regional Experiment Station. Whilst there have been some slight differences in grazing habits between the two localities, the trials have indicated that grazing by cattle in the northern part of the State is mainly confined to the early evening and early morning periods. These studies have now been in operation for a period of 12 months and it is hoped to make a similar series of observations on Brahman-cross cattle in the same environment.

At Kairi Regional Experiment Station, the dairy herd has been maintained at approximately 70 head, but milk production showed a slight increase over that of previous years. Experimental feeding has been continued and further information obtained on the growth rate of calves and the effect of nipple feeding. A trial on the feeding of BHC-treated grain to ascertain if it produced milk taint gave negative results. Progeny testing continues, and after bulls are used for a definite period they are sold to local farmers with a right to repurchase if heifers are high producers.

POULTRY FEEDING.

The effects of various levels of potassium penicillin fed in a chick-starter ration on the growth of Australorp cockerel chickens was conducted at Kairi Regional Experiment Station. It was found that one-third of an ounce of potassium penicillin to the short ton gave the best and most consistent weight increases. Other interesting features of this test were, firstly, that this antibiotic appears to give the greatest growth response during the first two weeks of life, and secondly, that as the chickens grow older the response to potassium penicillin decreases irrespective of the amount of antibiotic included in the ration.

At this Station, also, a breed production experiment was designed to assess the value of the White Leghorn × Australorp cross fowl in comparison with the pure breeds from which it is derived. Rearability, egg production, food utilisation, body weights at different ages, and carcase quality are points to be taken into consideration. From the results to date, the crossbred pullets have given higher averages and better food utilisation than the other pure breeds, but results for the first year of production will not be known until January 1954.

Experimental work on the use of condensed whale solubles as a source of animal protein for chickens was continued. Condensed whale solubles were used in chicken-starter mashes as a full and partial replacement for meatmeal. Chickens did not thrive when half the meatmeal in a ration was replaced by whale solubles and they also developed a type of dermatosis on the soles of the feet. When 4% livermeal was used in conjunction with whale solubles, no dermatosis occurred and the chickens showed better development than the controls fed on meatmeal only.

PIG CARCASES.

The feeding of fibre in the form of lucerne chaff to baconers has resulted in a more attractive carcase and prevented excessive fat development. Similar results have also been obtained with peanut hay. The Hammond system for the measurement of bacon carcases has been used in Commonwealth competitions for some time. Figures supplied from all States have been examined and have revealed an overall bias for the carcase in the lower weight range. This may call for some rearrangement of the present point score system so that length of carcase is increased in importance and underweight and overweight carcases penalised.

SEASONAL CONDITIONS AND PRODUCTION.

The year ended 30th June, 1953, was remarkable for contrasting seasonal conditions in various sections of the cattle lands of the State. An excellent distribution of rainfall throughout the year produced a continuous growth of lush pasture in the southern half, whereas one of the most severe drought on record was experienced in the north, particularly in the north-western section. This continued until the early months of 1953, when the advent of a heavy and prolonged wet season brought a welcome change to the pastoral outlook in that area. Since then, excellent seasonal conditions operated over the whole State, but the effect of a further dry spell is now becoming apparent, particularly in the dairying areas of the south-east.

Stock losses from poverty associated with drought were excessive in the north-western area, and large numbers of stock were moved to more favourable country for agistment. A large proportion of these animals have now been returned to their home pastures, and stock in all sections of the State are now in a very satisfactory condition. Pastoral production has been well above average in all areas with the exception of the drought-stricken country, which has nevertheless shown a remarkable recovery during the last six months.

Plate 9.—Identical Twin Heifers Kept for Experimental Purposes at Kairi Regional Experiment Station.

Plate 10.—An Imported Zebu Bull Immunised Against Tick Fevers at Yeerongpilly Animal Health Station.

Plate 11.—An Afrikander Bull from the First Consignment of this Breed imported into Australia.

Plate 12.—Baling Pasture Hay for Supplementary Feeding of Beef Cattle in the Clermont District.

The greater part of the sheep pastoral country experienced bounteous seasonal conditions during the year. However, in the north-west extreme drought conditions prevailed until January 1953. This caused severe hardship to new settlers who were successful in recent land ballots in these areas. While high totals were recorded, the falls were of low intensity and little surface water ran into dams and tanks.

Sheep numbers increased during the year to 17,029,623, in spite of the severe drought losses in the north-west. The increase of 870,500 was brought about by higher lamb-marking percentages than had been previously recorded on many properties in the central-west. Wool prices in general showed an upward trend until the last sale in June, when there was a slight decline. In all, 530,052 bales were sold for a return of £61,855,194.

The effects of seasonal conditions on production and disease are not always easy to predict. During the last drought, meat production remained high and it has continued at a high level during 1952 and 1953. This state of affairs was due firstly to the forced marketing of male stock in 1952 from many districts in an endeavour to save the lives of breeders left on the property. Good rains spread right through the latter half of 1952 and till the end of the summer in 1953 throughout most of Queensland, resulting in a steady flow of fat cattle right up to the present time.

The only exception was the north-west, but reduced turn-off from this area has not seriously affected the general State-wide slaughtering. It must be remembered that losses during the 1951-52 drought were breeders and young stock and this may affect the slaughterings during the next five years. It is from the north-west and Northern Territory that so many of the store cattle fattened in other areas are produced and in these areas the losses were heavy. It seems likely that many thousands of these cattle would have been saved had rail transport been available from the Northern Territory to the railhead at Dajarra. The average winter stream of tens of thousands of store cattle from the south-west was in 1952 just a trickle, and it is much smaller than usual in 1953.

Owing to the good pasture growth in the fattening areas of the State throughout the year, beef production for the year 1952-53 has been particularly high. Normal slaughterings were reported during the spring months of 1952, but during the following summer and autumn slaughterings were above normal. The export kill of March 1953 totalled 51,000 head of cattle, whilst the average March kill for the years 1950-51-52 was only 27,000 head. Brandings decreased in the year 1951-52, but made a very good recovery in the present year. The season is now rapidly declining and the availability of fat cattle in the spring of 1953 will depend on late winter and early spring rains.

Dairy production during the winter and summer under review was above normal, being of the order of 17 million gallons above the estimated average milk production for the last 10 years. Good winter and spring rains produced an excellent response in pastures and green crops and this was reflected in the milk production of dairy cows throughout the State. The failure of autumn and early winter rains has had an extremely bad effect on production, which is now falling very rapidly. This fall is in contrast to the high level of production maintained in the winter of 1952.

Egg production this year in the area controlled by the South Queensland Egg Marketing Board declined by a further 6%. This decline was not nearly as great as the steep decline of 21% during the previous year. The apparent arrest in the fall in production during the year under review has been due partly to the fact that feed prices have remained at a fairly stable though high level, thus allowing commercial egg producers to adjust their economy to meet these prices, and to the fact that during the latter half of the year feedstuffs, including animal proteins, have been in plentiful supply, thus ensuring that prepared mashes carry an adequate level of protein. In addition, the excellent climatic conditions which have prevailed during the year have been of great benefit to growing stock and pullets coming into production.

In Central Queensland egg production has declined by a further 33%, whilst in North Queensland the decline in production so apparent during the previous two years is reported to have been arrested.

As there has been no recovery in the prices paid for poultry meats on the overseas markets during the year, very few farmers engaged extensively in the production of cockerel flesh. The production of hen meats has also fallen far below that of the previous year, when rising feed costs and shortages of feed forced many farmers to sacrifice immature pullets being reared for replacement purposes as well as birds in full lay. The slaughter of so many immature pullets during the latter part of 1951 has meant that there has been a reduction in the killing of hens.

The number of stock suppliers has also fallen. It is of interest to note, however, that Departmental records show that the average size of flocks of the stock suppliers remaining in the industry has increased from 1,077 in 1947 to 1,266 in 1953. The trend in popularity of the dual-purpose breeds is evident from the fact that whereas in 1948 48% of the flocks were Australorps and 47% White Leghorns, in 1952-53 the percentages of Australorps and White Leghorns were 66% and 26% respectively.

There has been a small increase in the production of pigmeats as compared with last year due to improved seasonal conditions and availability of cereal grains and protein supplements. The quality of pigs forwarded to market is fair, but overfat pigs are again increasing. The Australian Pig Society (Queensland Branch) and the bacon factories have launched an advertising campaign against overfat pigs, but the problem is still of major importance to the industry. Technical data from 11,572 carcases have been collected and are being classified for use in forming suitable grade standards.

The present price of 2s. 3d. per lb. for first-quality baconer pigs applies to animals dressing 60 lb. to 160 lb. The top weight has been reduced from 180 lb. to 160 lb. to encourage farmers to market pigs before they are overfat.

DISEASE INCIDENCE.

The incidence of disease amongst stock with some exceptions has been below average and no spectacular outbreaks have been recorded. The losses associated with drought would outnumber by far the combined losses from all diseases. Contagious pleuro-pneumonia, although of lower incidence than in recent years, was again the most important disease amongst beef cattle. Fifteen outbreaks, including three in dairy herds in south-eastern Queensland, were recorded. Tick infestation and tick fever were responsible for losses in both the beef and dairy cattle industries. Losses from babesiosis and anaplasmosis occurred in beef herds in north-western Queensland. Due to improved diagnostic techniques, leptospirosis in dairy cattle was recorded in above-average numbers in the south-eastern section of the State; it was responsible for deaths in calves and adult cattle and loss of production.

Abortion due to trichomoniasis was diagnosed among dairy cattle on three properties, whilst abortion due to vibriosis was reported from several centres and is now considered to be more prevalent than was previously anticipated. Both these diseases are more difficult to control than brucellosis. Other sterility problems included neo-natal deaths in beef and dairy calves in south-eastern Queensland. This trouble was not associated with any of the common forms of sterility and the cause remains undiagnosed. Sheep diseases, including humpy-back, hypocalcaemia and urinary calculi, were more prevalent than during average years.

The tuberculin testing scheme was extended during the year, when the number of cattle tested totalled 281,654, as compared with 160,264 during the previous year. The number of practitioners under contract to the Department increased from 22 to 30. First-test herds, as would be expected, showed a higher incidence of tuberculosis than herds that have been under test for some years. Tuberculosis was also recorded from a limited number of beef cattle herds.

Cattle tick infestation was not recorded from previously infested areas in the vicinity of Walgra and Dajarra in north-western Queensland, but infestations are still present in the country between these areas and Camooweal. There have been slight extensions of the tick-infested area in the Roma, Wandoan, Burnett, and Toowoomba areas, but control by the maintenance of strategic dips charged with DDT continues to be effective. An additional dip was charged in the Boonah district. There is some indication that cattle ticks in certain areas are developing tolerance to BHC and other chlorinated hydrocarbon insecticides.

The buffalo fly infested area receded to the Gladstone district during the winter of 1952, and the control spraying plant was moved from Rosedale to Bororen. However, an increase in the fly population and an extension of the infested area necessitated returning the plant to Rosedale during the summer months.

Tuberculosis-free cattle studs have steadily increased in number during the last few years to 52 herds. The brucellosis testing scheme has expanded to 97 pig studs now under test. Routine blood testing by officers of the Poultry Branch has indicated a decrease in the incidence of pullorum disease in the flocks of stock suppliers, which has fallen from 4·4 % in 1947-48 to ·98% in 1952-53.

EXTENSION WORK.

Whilst all branches of the Division has intensified their extension work, attention is being given to the desirability and practicability of a change of approach. Most extension work has been directed towards the individual and has been achieved by personal contact. To be equipped for this work, regular training of staff is undertaken and successful schools have been held by each Branch. This has prepared the staff for an intensified campaign of field days, lectures, demonstrations, radio talks and written articles. Due to the comparative smallness of staff and the wide distribution of stock-owners, it is becoming apparent that industry must be taught some form of self-help, and individuals encouraged to follow the example of leaders in their respective districts. It seems likely that extension staff may be better employed in spending part of their time in influencing the attitudes of stock-owners generally than devoting the whole of their time to dealing with individual problems of the few. We are fortunate that the Director of Sheep Husbandry was given the opportunity of visiting the United States of America recently to study extension methods; the knowledge and experience he gained will be very useful in the training of staff for the future.

The development of extension through the various services, disease control, and the development of husbandry projects in association with agriculture are showing encouraging results. Particular instances of this are—

(1) The checking of the incidence of pleuro-pneumonia in the northern abattoirs, the tracing of the source of the affected cattle, and the appointment of a special veterinarian to teach stock-owners the methods of controlling this disease on the large breeding properties of the north by modern methods worked out by research workers, are doing much good.

(2) The charging of strategic dips with DDT and the treatment of travelling cattle to save loss of production by reducing tick incidence has done much to influence the outlook of stock-owners on tick control and made them aware of the advisability of treatment.

(3) The expansion of the State's veterinary services and the establishment of a subsidised veterinary service is quickly influencing the outlook of the stock-owners of the State and making them aware of the advantages of veterinary services.

(4) The establishment of the Wool Biology Laboratory and the increasing interest shown by graziers in fleece testing as an aid to selection can have far-reaching results in the breeding work of stud and flock masters.

(5) The development of co-operative work with the Division of Plant Industry, aimed at the production of high quality beef and lamb through agriculture, appears to have great possibilities.

(6) The establishment of small research projects and demonstrations on properties in the various districts of the State has not only been useful for the purpose for which they were planned but has succeeded in affecting the attitudes of stock-owners towards the adoption of improved methods.

DIVISION OF DAIRYING.

Director: Mr. E. B. Rice.

In contrast with the drought of 1951-52, seasonal conditions during the year under review have been the best enjoyed by the dairying industry for some years. Rainfall was above average in five months, and excepting for isolated short dry periods, its distribution was such as to enable production to be the highest recorded since 1942-43.

BUTTER PRODUCTION.

The rapid recovery from the effects of the previous drought year is readily apparent from a comparison of the quantities of butter manufactured during that and the present year, which were 28,212 tons and 49,425 tons respectively.

The results of gradings by Commonwealth and State officers were:—choice 46·96%, first 46·75%, second and pastry 6·29%.

The Commonwealth Government decided that as from July 1, 1952, it would not continue to pay a guaranteed price on the total production of butter and cheese as in recent years, but would subsidise only that portion of the production consumed within Australia plus 20%. Although the review of the cost of production figures indicated a farm production cost of 4s. 1½d. per lb. commercial butter this amount could not be returned to farmers because of the lower price received for portion of the exportable surplus. The Commonwealth Dairy Produce Equalisation Committee Limited recommended a pay-out to butter factory suppliers by factories of 3s. 10½d.

In recent years, the practice has grown in Queensland factories of adopting a more intensive system of pasteurisation of cream for butter manufacture, in which the tendency is to submit the cream to several stages of vacuum treatment during processing and to fit pressure-heads on vacreators to enable a temperature of up to 210°F. to be attained in the first stage of pasteurisation. The results achieved show that the treatment can be expected to assist in improving butter quality.

As dairy machinery has become more readily available during the year, many installations of improved equipment of various kinds were made at butter factories.

There is in the industry apathy towards striving for increasing the percentage of choice butter produced, due to the present narrow price differentials for grades of cream. Accordingly, the matter has been referred to the Australian Agricultural Council for consideration to be given on an Australia-wide basis to the fixing of price margins for cream grades in a manner which would offer encouragement to improve cream and butter quality.

CHEESE PRODUCTION.

The production of cheese was 9,439 tons in comparison with 4,700 tons in 1951-52. It is most gratifying to be able to report that the quality of cheese was the highest ever recorded in Queensland. Official grading figures were:—Choice and first 86·3%, second 13·2%, third ·5%.

The improvement in quality has been a pleasing reward for the efforts made by the industry and departmental officers over recent years. Factors which have mainly contributed to this success have been the centralisation of manufacture in larger factories, the virtual pasteurisation of all milk used for cheese making, the cheese milk quality drive, and improved processing equipment. There has been, too, an appreciable improvement in the standard of factory buildings and other equipment.

MARKET MILK AND OTHER MILK PRODUCTS.

Most of the milk now forwarded from country factories to Brisbane for pasteurisation comes by road milk tanker, with a consequent benefit to quality and the elimination of spillage en route.

The use of the square milk bottle for retail deliveries of bottled pasteurised milk, which had extended rapidly in recent years, proceeded a further step during this year, with the result that only the square bottle is now being used for the Brisbane trade.

The Milk-in-Schools Scheme was introduced in Brisbane, and is being extended to country centres where pasteurised milk is available.

Two new factories which are equipped for the manufacture of powdered milk are expected to commence operations about August, 1953, and there has been a considerable amount of interest shown by other companies in the drying of milk by-products, such as separated milk, buttermilk and whey. In all, 12 factories have now made provision for the drying of whole-milk or milk by-products, and undoubtedly if a return equivalent to their value for animal feeding could be assured, the conversion of raw by-products into manufactured by-products would be vastly expanded in this State.

HERD PRODUCTION RECORDING.

The production recording of both purebred and grade dairy cattle continues to make steady progress. Associated projects such as sire surveying, registers of merit and surveys of data from recorded herds are providing valuable information of State-wide significance.

There were 1,087 cows in the 118 herds entered under the Pure Bred Production Recording Scheme. Of these, 560 (51·5%) passed the qualifying standards, and the average production per cow in all herds, irrespective of length of lactation, was 290 lb. butterfat.

Fifty herd recording groups were operating during the year, an increase of five over the previous year. For the year ended September 30, 1952, 23,123 cows in 818 herds completed lactations, but due to the severe drought for most of that recording year the average production fell to 112 lb. butterfat, compared with 146 lb. in the preceding year.

The average cow milked only 209 days, and an analysis disclosed that cows which milked for a full lactation of 273 days produced an average of 149 lb. butterfat, whereas those with shorter lactations produced only 93 lb. The necessity for the more general provision of sufficient fodder at all times to maintain a longer milking period is obvious.

Surveys of yields of 84,000 cows during the past four years have shown the benefits to be gained from calving cows during the months of July to September. The comparative average productions according to the months of calving were:—January to March 126 lb., April to June 140 lb., July to September 150 lb., and October to December 138 lb. butterfat.

As varying seasonal conditions were experienced during these years, the results indicate the advantages to be gained from seasonal calving; moreover, as less than one-third of the calvings took place during the most favourable months, they suggest the desirability for more attention to be given to controlled management, with a view to having as high a proportion of the herd as possible freshening at the optimum time. An increased yield of at least 10% could reasonably be expected from this practice.

It is evident from the results of surveys that, in order of importance, the chief causes of herd wastage are low production, old age, sterility, and udder troubles.

The average cow completes barely five lactations before being culled from the herd. Improved management, including the control of udder disorders, would probably enable the average working life to be extended to seven or eight lactations. As a consequence, fewer heifers would need to be reared for herd replacements; this, in turn, would mean that more milkers could be kept, total farm production would be higher, and costs would be reduced.

DAIRY INDUSTRY EFFICIENCY SCHEME.

During the preceding drought year, production on the demonstration farms fell much less sharply than the district average, and during this year the demonstration farms have recorded greater increases than district averages.

It is also pleasing to report that the quality of milk and cream produced on the demonstration farms has been significantly improved; if a similar standard were generally attained, the output of choice grade butter in Queensland could be stepped up by over 30%.

Nearly nine thousand people attended the 115 screenings of the mobile film unit.

DAIRY RESEARCH BRANCH.

By means of research and laboratory control schemes, the efforts of the Division are being directed towards assisting the industry to attain higher standards of efficiency and improved quality of milk and its products.

In response to representations from industry organisations, steps were taken during the year to establish branch laboratories at Murgon and Malanda. The Murgon laboratory was opened in December, 1952, and an officer has been transferred to take up duties at the Malanda laboratory in July, 1953.

Investigations.

Investigations into the seasonal decline in the composition of milk during the late winter and early spring months have continued. The drop in the fat content of milk was not as marked as in former years, no doubt due to the favourable seasonal conditions, but it was of sufficient significance to cause difficulty on many farms in producing milk satisfying the statutory minimum fat percentage. Response to the feeding of long roughage were again evident, although less pronounced than in the previous year.

A survey of data made available from a large milk pasteurisation factory and from herd recording groups indicated that the decline in the fat content is State-wide.

In the subtropical climate of Brisbane, large numbers of samples of milk from producers fail to give a methylene blue test of four hours in the summer months. It has been shown that the time and temperature of storage between milking on the farm and arrival of the milk at the factory significantly affect the methylene blue test of milk. During the summer months, therefore, the test becomes more a measure of storage conditions than of production methods on the farm.

An investigation is in progress with a view to evolving a means of compensating for time and temperature of storage, so that when the milk is tested by methylene blue test at the factory, the results can be compensated for these conditions. Naturally, it is the responsibility of the farmer to supply milk which conforms with the prescribed standards, but a compensated test would be useful for advisory work among producers.

Studies on the keeping quality of pasteurised milk under various conditions of storage indicated that under Queensland climatic conditions daily delivery of milk to the consumer is desirable in the summer months under the available methods of storing milk in the average household. Even milk held in a refrigerator developed a discernible flavour defect after 24 hours' storage.

Until recently, the only practical means of determining the texture of butter was by visual examination. Texture is largely determined by the dispersal in the butter of the moisture droplets, which is dependent on the degree of working during manufacture. A laboratory test was devised for counting moisture droplets above a minimum size microscopically, and this test is now being used in the routine examination of samples of butter.

Investigations have continued on the losses of fat in the buttermilk drained off during the process of butter manufacture. Fat losses due to this cause have now been estimated at 30 factories, at which 312 determinations were made. The losses varied from 1·01% to 1·51%. Where vacuum treatment is part of the pasteurisation process, fat losses are slightly increased, but they appear to be independent of the intensity of processing. They are influenced chiefly by the fat percentage of the cream at the time of churning, the extent of the agitation of hot cream, and the temperature to which the cream is cooled before churning.

Further work is proceeding in an effort to evaluate more specifically the relative importance of each of these factors.

Difficulty is being experienced in importing into Australia suitable timbers for the manufacture of butter churns, and it appears that churn manufacturers will, in future, have to depend on Australian timbers for this purpose. There has been some trouble with fungus attack of these local timbers, and experiments are being made on treating them with zinc napthenate to control the fungi. Laboratory tests have given promising results, and as a result a churn constructed of treated North Queensland kauri pine is being installed in a factory to determine the effectiveness of the treatment under factory conditions.

Trials are in progress at Murgon to determine the efficiency of cooling milk for cheese manufacture by various methods. The trials have not yet progressed long enough to give determinative results, but they do tend to show that refrigerated milk gives the best quality cheese. The economics of the alternative methods of cooling will also be investigated.

Research on cheese starters and the control of bacteriophage have been of much benefit to the Queensland cheese industry. The recommended procedure for control of bacteriophage, which must be faithfully followed in the factories, includes the provision of approved starter propagation facilities, rotation of starter strains, good factory hygiene, and the chlorination of cheese vats and all milk and whey equipment just prior to use.

An exhaustive survey of factory and farm water supplies is giving information which is of distinct economic advantage. By adopting the laboratory recommendations based on chemical analyses of these waters, corrosion of equipment is being minimised, detergents used more effectively and economically in factories and on farms, and time saved in cleaning.

Laboratory Control Services.

The laboratory control services provide information which, apart from its guidance to factories and farmers, forms the basis of much of the advisory work of officers of the Division.

The following is a summary of the work performed during the year under these schemes:—

Milk samples	10,862
Methylene blue tests made at Brisbane milk factories	75,502
Fat tests made at Brisbane milk factories	32,028
Bacteriological examinations of butters ..	2,249
Chemical analyses of butters	2,047
pH estimations of butter	1,085
Microscopic examinations for butter texture	2,168
Analyses of cheese samples	101
Chemical analyses of factory waters ..	149
Miscellaneous chemical analyses	1,059
Pieces of glassware tested for compliance with Dairy Produce Acts Standards	9,215
Cheese starter cultures distributed ..	968
Surveys of milk pasteurisation factories	75
Surveys of butter factories	60
Surveys of cheese factories	44

In conducting a technical survey, an officer of the Research Branch, usually accompanied by a field officer, visits the factory to carry out various bacteriological tests, other tests and observations, with a view to assisting in the improvement of hygiene and/or efficiency of processing.

Market Milk.—Most milk forwarded from country chilling factories to Brisbane for pasteurisation is now transported by road milk tankers, which has eliminated spillage losses and helped to maintain quality. Bacteriological examinations of the cleaned tankers have given satisfactory results.

With a view to improving milk supplies for pasteurisation, examinations for thermoduric bacteria, which are resistant to heat, although of no public health significance, have been extended since a method for performing large numbers of these tests with economy of time and media has been developed in the laboratory. The laboratory results of these and other tests are notified promptly to the factories and the farmers, as well as the field staff, with a view to the necessary improvement being effected on any inferior samples. As 99·5% of the phosphatase tests were negative, a high standard of efficiency of processing in the factories is indicated.

Laboratory examinations have been made and other technical help given in connection with the Milk-in-Schools Scheme which came into operation during the year.

Butter.—A good overall standard of hygiene was maintained in the butter factories; the bacteriological results showed a slight improvement over those of the preceding year.

The chemical analyses of butters revealed that a high standard of control is now being exercised over the composition of butter, with definite economic advantage to factories. It is estimated that the better control of manufacture is returning to the industry £200,000 yearly more than would be obtained if the composition had not advanced so markedly over the intervening years since the laboratory service was introduced.

Efficient neutralisation of cream and "working" during manufacture are important factors in improving the keeping quality of butter.

The examinations for acidity (pH) and moisture-droplet distribution in butters are carried out as routine determinations for the guidance of factories in controlling these two aspects of manufacture. It is evident that, in general, managers and buttermakers are applying the laboratory results with the object of producing butter which will stand up to prolonged storage, but there are a few factories which could give closer attention to these matters.

Analyses of samples of powdered buttermilk, separated milk and whey, coupled with technical advice, have been appreciated by companies which have recently engaged in manufacturing these products, with a view to the better utilisation of milk industry by-products.

Cheese.—In the course of 44 visits to cheese factories, samples were taken for examination and advice given by officers on aspects of manufacture, the handling of starters and the cleaning of factory equipment.

Failure of starters due to bacteriophage can be costly through overtime incurred in handling "slow" or "dead" vats and depreciated cheese quality, and endeavours were made to assist factories to overcome this by demonstration and advice on correct starter handling methods and other recommended measures in factory hygiene.

A wide range of miscellaneous samples, which included various kinds of milk by-products, waters, margarines, boiler scales and brines, was examined, mainly for advisory purposes.

OTHER ACTIVITIES.

Stimulated by the increased quotas of table margarine approved during the year, considerable activity took place in the rebuilding of margarine factories and the provision of improved processing equipment.

Apart from the advisory, research and control schemes, officers of the Division have devoted a good deal of their time to the routine administration of the various Acts and other activities of the Division.

Three officers resigned from the Division during the year and seven new appointments were made.

The staff have generally diligently performed their duties.

DIVISION OF MARKETING.

Mr. H. S. Hunter, Director of Marketing.

In the field of marketing most agricultural industries have met with increasing resistance from the buyer to the continued upward trend in prices; whilst on the other hand the producer has not been relieved of the pressure of rising production costs.

On the export market, with certain notable exceptions—such as sugar and wheat—competition has reduced price levels to narrow the margin between overseas and domestic prices. Vast surpluses of farm products in North America constitute a threat to sterling area price levels, and the gradual implementation of the United Kingdom policy of dispensing with long-term commodity contracts associated with Government-to-Government trading is a pointer to further competition in that important market.

The release of coarse grains from export control was effected during the year. This was possible because of the record wheat crop and the breaking of the drought in pastoral areas. Price levels fell considerably from the high points they reached in 1952, although the overseas market can still be considered a profitable one.

In the dairying industry, however, domestic prices for butter and cheese, notwithstanding the assistance given by substantial subsidy payments, now exceed the price realised under the United Kingdom contract.

This situation is vividly illustrated by the arrangements for 1953-54 marketing of butter and cheese which have departed radically from those of former years by not increasing the guaranteed return to the farmers or the price to the consumer in Australia. Despite the fact that costs have increased, this action has had the support of large sections of the industry, which has appreciated the fact that there was a significant reduction in domestic consumption of butter in 1952-53 owing to consumer resistance to high prices and that any further diminution of local sales which will result in the transfer of increased surpluses to overseas markets at lower prices will merely reduce the overall return to the industry.

The local market for some commodities has been considerably disturbed by increasing competition from overseas sources. In this category may be mentioned linseed and ginger. The outlook for the former has deteriorated during the past 12 months because of grower uncertainty as to price. As to ginger, this Queensland industry has found its cost structure excessive in relation to the returns it can command, and is meeting with severe competition from imports. Both of these industries have been the subject of inquiry by the Tariff Board during the year, although no announcement of the results has been made. There is a natural tendency on the part of growers to shift their attention to other industries where market conditions appear to have greater stability.

A similar situation has arisen in some of the fruit industries, such as figs and strawberries, which depend on processing, although here the competition is from other locally produced fruits, and difficulties have been enhanced by a rapid expansion of production. This phase of fruit marketing now merits serious examination, as there will be a tendency to increased competition in other important products, of which pineapples may be cited as of major importance. This is particularly so because of the expansion of canning facilities that has taken place in the post-war years under the stimulus of grower co-operative development in this field. The need for emphasis on cost reduction and quality production is nowhere more amply demonstrated than in these industries, which have had an attractive and profitable seller's market since the war. It is an advantage that growers should have their own organisation and canneries to ensure the utmost stability possible in any given marketing situation, but growers also have their part to play and too much reliance on organisation and cannery alone could prove a weakness, unless strict attention is given to economic and quality production.

Tobacco has continued to provide a difficult marketing situation because of the continued failure of manufacturers to absorb all of the usable leaf. Following an investigation into leaf quality, a series of conferences has been held between the State and Commonwealth Governments, growers and manufacturers. These have not been completely successful, particularly as regards the disposal of leaf unsold at auction in 1952, which totals 251 tons. However, further investigations are being made into the cost structure and economics of the industry.

The failure of the United Kingdom to agree to participation in the International Wheat Agreement has highlighted the new marketing situation which has arisen in the wheat industry and which is further complicated by reason of the conclusion with the 1952-53 wheat crop of the stabilisation plan. A number of discussions on the nature of future wheat marketing in Australia have been held.

However, despite these marketing difficulties, which represent an apparent return to pre-war conditions, the overall position of primary industry is sound. These strains and stresses are, after all, part of the normal pattern of marketing and it would be wrong to deduce from them that there is any the less need now for increased production than since the war. Some industries are bound to feel the impact of changed conditions more than others, but these are problems that have to be accepted in the nature of a challenge either by developing better handling and giving greater attention to quality or by adjusting organisation of selling arrangements to meet the new conditions.

Plate 1.—Tobacco Leaf Displayed for Examination on the Brisbane Floor.

Plate 2.—A Tobacco Leaf Sale in Progress at Mareeba.

Plate 3.—Seed Testers Examining Seed Germination Trays in the Brisbane Seed Testing Laboratory.

Plate 4.—A View of the Temperature and Humidity Control Room at the Brisbane Seed Testing Laboratory.

The services provided by the Marketing Division, which include crop forecasts, monthly reports on production trends and market price reports, have been further expanded during the year by the addition of poultry industry reports and the inclusion of a supplement with the Production Trend Report dealing with price trends in one or other of the fruit, vegetable or produce crops. Investigation is now under way into the procedures adopted in the compilation of forecasts.

STANDARDS BRANCH.

"*The Agricultural Standards Act of* 1952," consolidating and revising the legislation relating to the control of seeds, fertilizers, growth regulating materials, lime, stock foods, veterinary medicines and pest destroyers, and providing for the control of quality of marking preparations and testing reagents, was proclaimed on July 24, 1952.

The General Regulations under this legislation came into operation with the proclamation of the Act. These were followed by the Veterinary Medicines Regulations. As opportunity occurs, the remaining regulations under the previous Acts will be revised and put into operation under this Act.

The Agricultural Requirements Board, which replaced the Pest Destroyers and Veterinary Medicines Boards, maintained a constant vigilance on claims made with respect to efficacy of certain preparations, as a consequence of which 21 preparations were refused registration. Misunderstandings which must occur with alteration of registration procedure consequent on the introduction of the new Act were handled satisfactorily by the staff and inconvenience both to the trading community and to the Department was negligible. The number of preparations handled by the Registration Section continues to show an increase, some 1,728 being considered this year.

Inspections of the premises of 410 sellers of agricultural requirements, covering the coastal area from the New South Wales border to Townsville and as far west as Roma and St. George, were made. An increased number of samples of seeds for sowing was obtained; also twice as many samples of agricultural requirements other than seeds were taken. The quality of the material represented by these samples was, in the main, satisfactory, but action had to be taken to destroy a quantity of dolomitic limestone which failed to reach the prescribed standards. The quality of Rhodes grass seed has considerably improved, partly due to most favourable harvesting conditions, which enabled the seed to be taken off before second growth had occurred.

The export of Rhodes grass seed from the port of Brisbane reflects the good weather conditions prevailing at the time of harvest. Over 4,000 sacks were exported, compared with only 39 sacks in the previous year. The quantity of paspalum seed exported was doubled.

The number of efficient seed-cleaning plants operating in the State is increasing; the effectiveness of this is represented to some extent by the reduced number of samples which fail to reach the prescribed purity standards.

The production of certified seed is continuing. In the case of hybrid maize and grain sorghum, the total amount harvested is slightly down. In the case of sweet sorghum, while the quantity has increased, three-fifths of the total amount available had to be rejected due to poor germination. For the first time since the introduction of Sudan grass into the certification scheme, some 2,000 bushels were harvested Unfortunately, during the 1953 season none was planted owing to adverse weather conditions. The quantity of French beans certified, which amounted to 60 bushels, was only enough for use for reproduction of certified seed. Cowpeas were certified for the first time, with satisfactory results. The amount of tomato seed produced was over 300 lb., more than twice as much as had been produced in previous seasons.

CLERICAL AND GENERAL DIVISION.

Mr. W. T. Gettons, Assistant Under Secretary.

The Clerical and General Division of the Departmental organisation provides the avenues through which the work of the Department is channelled.

It receives the mail initially, records and distributes it and despatches the outward correspondence. It provides the accountancy and commercial services, includes the Information Branch and Transport Section, and attends to miscellaneous matters not coming within the province of other Divisions. The Records Branch figures give an indication of the constantly increasing activities of the Department. During the year 87,423 letters were recorded, as against 78,655 the previous year.

A total of £2,245,871 in receipts and payments was handled by the Accounts Branch, compared with £1,840,190 in the previous year. Contributing to this increase were greater expenditure on special extension services from funds contributed by the Commonwealth Government, tuberculin testing of cattle and payment of compensation for condemned animals and purchase of properties for the Animal Health Sub-Station at Rocklea and the Inglewood Tobacco Station. Increased grants were made to the Stock Diseases Fund, the Diseases in Stock Compensation Fund and the Dairy Cattle Improvement Fund.

Following an amendment of the Diseases in Stock Acts, operative as from the 1st January, 1953, this Department took over from the Government Statistician the work of collecting, recording and checking the stock returns of stock-owners in the State. This work is under the control of the Accountant.

In addition to ordering the goods required at the Department in Brisbane and 90 country offices, the Commercial and Despatch Branch supervises the purchase of materials for the maintenance of some 20 experiment stations and farms besides several public gardens. The increase in the volume of work is reflected in the numbers of orders placed, which have increased by 50% in the last four years. In the same period the postage bill covering the despatch of mail, parcels and telegrams, has gone up 100%; an increase in postage rates accounted for some of this rise.

The total staff of the Department at the 30th June, excluding about 116 seasonal employees stationed at sugar mills during the cane crushing period, was 933, compared with 891 for the previous year. The increase in staff shown includes 11 clerks and clerk-typists needed to fill vacancies and to meet the demands of expanding services and 5 officers transferred to handle the stock returns mentioned above.

The salaries and wages bill increased from £645,415 in 1951-52 to £771,487 for 1952-53.

TRANSPORT.

During the year 40 motor vehicles were purchased, mainly to replace old vehicles, the use of which had become uneconomical. At 30th June the Department had a total of 209 cars and utilities; the aggregate mileage travelled by these vehicles during the year was 1,424,542 miles. In addition, 236 officers operate private motor cars for official purposes on a mileage allowance basis.

Although the transport facilities have improved, there are still some field officers whose activities are hampered by lack of transport units.

PUBLICATIONS.

The information services operate under the supervision of Mr. C. W. Winders. With the expansion of Departmental extension activities, there has been a steady increase in the number of subscribers to the *Queensland Agricultural Journal*, the Department's monthly farm advisory publication. Some 14,500 copies of the journal are now printed each month, compared with 8,000 copies 10 years ago.

There is still room for a considerable increase in circulation. For some years past the Brisbane Milk Board has paid for the journal to be sent regularly to all suppliers registered with the Board. A like service provided by other organisations might well be expected to yield useful results in increased efficiency of farming.

The journal is supplied at the nominal charge of one shilling a year to Queensland producers, junior farmers and students; in addition others interested in agriculture may subscribe at the rate of ten shillings a year.

All sections of primary producers are catered for in the journal, the range of subjects dealt with during the past year including agriculture, horticulture, dairying, beef raising, pig raising, sheep and wool production, bee-keeping and even goat management.

There was a very large distribution of leaflets and pamphlets during the year. Seventy new or revised publications were printed, for a total of 122,000 copies. Approximately 300 different publications are now available to farmers and graziers, and new titles are being added every week.

The Department's weekly News Bulletin was sent regularly to newspapers and broadcasting stations and was widely used throughout the State as well as by farm papers published in other States. Special articles were supplied by various Branches to newspapers for both regular issues and special supplements. Frequent press releases on current items of news were made throughout the year.

Some noteworthy numbers of the Department's scientific quarterly, the *Queensland Journal of Agricultural Science,* were issued during the year. Of particular interest were articles on investigations of chronic endemic fluorosis of sheep in Queensland and studies of the drought problem. Contributions from the Department's research staff were made also to other scientific and technical journals.

The second edition of Vol. III of the *Queensland Agricultural and Pastoral Handbook,* dealing with insect pests and diseases of plants, was published during the year and some 2,000 copies have already been sold. The book is priced at £1 a copy to the general public but is being made available to Queensland primary producers at the concession price of ten shillings. It is expected that the second edition of Vol. II (Horticulture) will be ready in 1954. Vol. I (Farm Crops and Pastures) is out of print and a revised edition is now being prepared.

CENTRAL LIBRARY.

The Central Library circulates over 150 different periodicals to more than 200 Departmental officers. A census taken in May showed that on the particular day 1,800 copies of periodicals were in circulation. The library receives monthly over 200 publications other than periodicals and books. In addition, 150 periodicals and numerous books are handled weekly by the Central Library on behalf of Branch libraries.

The continued decentralisation of the Department's services and the establishment of new field stations have increased the work of the Central Library, even though special libraries are established at most centres.

BROADCASTING.

Increased use has been made of radio in Departmental extension work. Several national and commercial stations are now providing regular broadcasting time, and many specialist officers are participating in the programmes. In addition, the Information Branch has prepared numerous scripts for broadcasting by its own officers or by regular radio announcers.

SHOW EXHIBITS.

The Department's court at the Brisbane Royal National Show is now generally acknowledged to be one of the highlights of the Show and draws very large attendances. The exhibit not only provides an excellent opportunity for bringing improved practices before many primary producers but it is also an excellent medium for Departmental publicity.

Various Branches exhibited at country shows during the year, featuring subjects such as soil conservation, fodder conservation, dairy farm efficiency and weed identification and control.

PHOTOGRAPHY.

Within recent years, several Branches have supplied many of their field officers with cameras for the purpose of making photographic records for research and extension purposes. As most of the developing and printing is done in the Photography Section, this has meant more work for the section. Enlarging work has also increased because of the greater use of small cameras by field officers.

GENERAL.

There is a continuous demand on the Department for information on subjects of an unusual nature—many of them not closely related to farming—that are not covered by Departmental printed matter. The Information Branch has spent a good deal of time in giving attention to such enquiries and in filing material likely to be called upon.

A newspaper clipping service is provided for Departmental officers to keep them abreast of local and general matters of interest and use to them in their respective fields, administrative or technical.

Numerous prospective settlers from other States and countries have sought Departmental advice on farming matters during the year. Each case has been dealt with on an individual basis.

A good deal of assistance has been given by various Branches to liaison officers of the State Migration Office in settling migrants on the land and in providing them with advisory services after establishment.

REPORTS OF BRANCHES.

AGRICULTURE BRANCH.

Mr. D. O. Atherton, Director of Agriculture.

The weather in the winter and spring of 1952 was generally favourable in agricultural districts, particularly for winter crops. Early summer months were very dry and accordingly the sowing of crops was seriously delayed, and in some cases curtailed. The monsoonal rains began late in summer but continued well into autumn, when they were accompanied by mild weather which allowed late-planted summer crops to mature. Conditions for early-planted winter crops were good but a dry June has delayed main sowings.

FIELD CROP INVESTIGATIONS.

Wheat.

The season of 1952 was notable for above-average rainfall prior to planting and during the growing season, severity of frost damage on the Darling Downs and adjacent districts, and comparative freedom from stem rust and other serious diseases. November was hot and dry, providing ideal conditions for harvesting prime grain.

It has generally been recognised in Queensland that frost damage may be very evident in the seedling stage of the crop, or during the early heading stages. The first type results in some leaf injury, causing a temporary setback, but recovery is generally complete. The second type is more spectacular and may result in the total loss of affected crops. During the 1952 season the main frost incidence was at an intermediate stage, resulting in severe damage to the elongating stems. Field observations gave no consistent picture of varietal reaction to such frosting, and showed no correlation between resistance at the seedling stage and subsequent behaviour. In spite of evident widespread losses through stem frosting, a record yield estimated at over 18 million bushels was harvested from some 724,495 acres. Bulk handling was initiated on a number of farms on the western Darling Downs and this method of handling the crop was eminently successful during a favourable harvesting season. The Queensland variety Lawrence occupied third position in total acreage with 75,735 acres, while Spica covered 3,354 acres in its first season of general distribution.

The experimental programme included some 15 varietal trials on the Darling Downs and subsidiary districts. The main deductions from the trials were as follows:—(1) Gabo did not finish well under wet end-season conditions; (2) Spica maintained its excellent yield record; (3) Festival and Saga yielded poorly in comparison with established local varieties; (4) some unnamed Queensland hybrid selections appeared to yield higher than any of the named varieties; (5) this year no one variety possessed effective resistance to stem frosting, although clear-cut varietal differences in susceptibility to early leaf frosting have previously been established; (6) Gabo and Fedweb were the outstanding varieties in the Callide and Dawson Valleys, while Charter, Spica and K_2P_4-4620 were most prominent in the Burnett district; (7) Lawrence was the best of the slower maturing dual-purpose wheats, being equalled only by a newer hybrid selection, K_2Wpt-4604; (8) the fertilizer trials on the Darling Downs provided no clear-cut indication of any fertilizer requirement there.

Oats.

The season was generally favourable for grazing oats, and some excellent results were obtained from experimental plantings. The good season also favoured excellent seed production of popular crown-rust resistant varieties.

The most important feature of the season was the occurrence for the first time of Victoria blight disease. This is a destructive disease which attacks only varieties which carry crown-rust resistance derived from the variety Victoria. Since such varieties have become the mainstay of farmers in the wetter districts, this newly reported disease is serious.

The hybrid selection BVH-4709 is being multiplied for distribution as a new variety. This strain is crown-rust resistant like Vicland and Fultex, but derives its rust resistance from Bond, not Victoria, and therefore is resistant to both crown-rust and Victoria blight.

Maize.

The season in the South Burnett started badly, but the delayed advent of winter enabled most late-planted crops to mature without serious frost injury. Elsewhere in Queensland seasonal conditions have been average.

Interest in hybrid maize is increasing and farmers are regularly claiming higher yields and improved drought resistance on behalf of hybrids over open-pollinated varieties. Recent tests in the Central Burnett indicate that recommended South Burnett hybrids such as Q23, Q431 and Q692 are capable of excellent yields further north. Other reports testify to the versatility of Victory Hybrid, which is a New South Wales hybrid based upon four Queensland parent lines.

The use of appropriate hybrids has considerably extended the limits to which maize yields may be increased by careful attention to plant stands and the application of irrigation and fertilizers. A yield of 94 bushels per acre was obtained from the Gympie district in the 1951-52 season with the application of superphosphate and sulphate of ammonia, while in the Beaudesert district in the 1952-53 season yields of over 100 bushels per acre have been obtained from hybrid crossing plots under irrigation.

Sorghum and Sudan Grass.

The season was generally unfavourable for summer crops in southern Queensland, mainly because the early summer rains failed. Late-planted grain sorghums are normally very subject to midge attack and run a serious risk of frost damage. In Central Queensland the season was more favourable and some excellent crops resulted.

Progress in the breeding of new varieties continues, but weather hazards have not favoured the strain-testing programme. Some dozens of promising new selections are available for testing in comparative yield trials. In such trials the two Queensland varieties Alpha and Capricorn have yielded well and Coastland shows greater freedom from caterpillar attack than any of the standard varieties. All three varieties are recent products of the Queensland plant breeding programme.

Breeding Sudan grass for low prussic acid content is an important feature of the crop improvement programme, since the achievement of this aim will greatly enhance the grazing value of this crop. The low-prussic-acid selection from Roma Sudan grass (R.S.3) is now being increased for general release. Similar work has been carried out in Sweet Sudan grass, which is a quite recent importation from the United States. The local selection (S.S.6) is an attractive leafy strain showing good recovery after cutting and a low prussic acid content. Unlike the common Sudan grass, it is juicy and sweet to the taste. A 3-acre increase plot of this new selection yielded 84 bushels of seed, which should prove an excellent pure-seed nucleus for seed certification and general distribution.

Linseed.

It was recorded last year that linseed had then attained an important position in Queensland agriculture and could partly displace wheat, particularly on the lighter soils of the Darling Downs. During last season, however, a drop of over 30 per cent. in the linseed price has seriously upset the balance between these two crops and favours wheat at the expense of linseed.

Attempts are now being made to improve the yield of linseed by plant selection and the introduction of new varieties. Four selections from Uruguay, Calar, Viking and Zona Buenos Aires have averaged at least 40 per cent. higher in yield than the commercial variety Walsh in experimental plots. Seed increases are now being made of these and large-scale tests will be established to verify the results of the nursery trials.

Pumpkins.

A plant breeding project designed to improve the uniformity and quality of the Beaudesert pumpkin was commenced at Boonah in 1952-53. Six different seed sources were used to initiate the programme, and a number of controlled pollinations have been made within each strain. Interesting differences are already appearing between different lines, and it is possible that more than one variety may eventually be obtainable from the present heterogeneous stocks.

Cotton.

Production of this crop has been stimulated by an increased guaranteed home price for lint and improved facilities for mechanical harvesting. Returns for the 1951-52 season showed a production of 2,184,268 lb. of seed cotton from 5,866 acres, or 778,277 lb. more than was grown in the previous season. The percentage of the 1951-52 crop machine-harvested was 42·6, compared with 29·5 per cent. in the previous season. Returns are not available for the current (1952-53) season, but the effective acreage was 11,000, and a good season occurred in the major producing districts of Central Queensland.

The experimental programme covered varietal improvement work, varietal trials and mechanical harvesting and defoliation trials. Burdekin trials confirmed previous results in showing Coker 100 to be an outstanding irrigation cotton for that district, where it produced more than 1 ton of seed cotton per acre. Empire was second to Coker on the Burdekin, and first in the irrigation trial at Theodore. Improvement in fibre quality of jassid-resistant Miller strains has been recorded, and replacement stocks for Miller 43-9-0 are improved.

Cowpeas.

Field tests last season have indicated that useful resistance to stem rot might be found in the varieties Cristaudo, C.P.I.9432 and an unnamed hybrid (Victor x Large White x Skewbald x Poona). Some improvement might well be expected as a result of introducing Cristaudo into southern Queensland and naming and liberating the above hybrid. The latter has done well in experimental plots at Kingaroy, and merits general distribution upon purely agronomic grounds. It is at least the equal of Cristaudo, and clearly superior to Poona and Reeves, as a green manure crop in the Innisfail district.

Should the introduction of Cristaudo and the new hybrid to general cultivation in south-eastern Queensland fail to counter stem rot, a much wider search for resistant varieties will be called for, and a short-term breeding programme may even be required.

Peanuts.

The rehabilitation of this crop has been seriously hindered by two successive bad seasons in the South Burnett district. This disadvantage has been offset to a slight degree by the increased interest in the crop in the Upper Burnett and Bundaberg districts, and in the Atherton, Mareeba and Cooktown areas. On the Atherton Tableland peanuts are reported to have encroached upon maize acreage during the past season, and scope for vastly increased development exists in this and other districts of Far North Queensland.

Potatoes.

Fluctuating returns, high costs of production and the ever-present risks of heavy losses from pests and diseases are disturbing to potato growers.

The practicability of using seed from the Lockyer Valley spring crop as a source of planting material for Burdekin growers was examined in two varietal trials at Ayr. Seed held in cold storage was firm with slight eye development and loss in storage was less than 2 per cent. Barn-stored seed was shrivelled and soft, with excessive development of spindly-shoots, and showed over 50 per cent. loss in storage, the worst varieties being Sebago and Sequoia. Germination of cold-stored seed was rapid but growth was less vigorous than that from the interstate seed normally used by Burdekin growers. Germination and general growth of barn-stored seed were inferior to those of cold-stored seed.

Cold-stored seed (3 tons of marketable tubers per acre) outyielded barn-stored seed (1·5 tons), Exton (3·7 tons for cold-stored seed and 2·5 tons for barn-storage) being the best variety. However, Sebago *ex* Victoria (6·8 tons) and Bismark *ex* Tasmania (5·7 tons) were superior to all other varieties and sources of seed. There was insufficient barn-stored seed for the second trial, but otherwise the yield trend was similar to that in the first. Bismark *ex* Tasmania (9·7 tons of marketable tubers per acre) and Sebago *ex* Victoria outyielded the cold-stored seed, the best of which was Exton (6·2 tons).

These results indicate that obtaining seed direct from Tasmania and Victoria, as at present, appears to be better for Burdekin growers than storage of seed from the Lockyer Valley spring crop.

In a varietal trial at Ayr, in which cut seed and whole seed were compared, the mean yield of marketable potatoes from whole seed for all varieties (6·9 tons per acre) was better than that for cut seed (5·2 tons). Sebago (7·7 tons for whole seed) and Bismark (7·5 tons) were the best varieties. Nevertheless, when seed is very expensive it would probably pay to cut large seed, provided the seed is well shot before cutting.

In a varietal trial at Gatton Irrigation Research Station, Exton (6·26 tons marketable tubers per acre) and Sebago (5·97 tons) were the most impressive varieties. In a size-of-sett trial at the same centre, the smallest size (1-1½ oz.) gave the highest yield.

Onions.

Because of good prices for early onions and poor prices for late onions in 1951, an unusually large area of early types was planted in 1952. Growing conditions were favourable and the early market was over-supplied, but good-quality late onions sold well. The cost of good seed of local varieties was reasonable in 1953 and plantings have been adjusted to conform with likely demand.

A trial at Gatton Irrigation Research Station showed that sprouting of stored onion bulbs was not reduced by an IPPC (iso-propyl-phenyl-carbamate) preparation. In a bulb-sett trial at the same centre, the smallest setts (½-1 in. in diameter) gave best results and the variety Earligold showed most promise. This method of planting produces marketable bulbs earlier than seed.

Lucerne.

Lucerne can be grown on arable soils over a large area of Queensland and it can also be a useful component of pastures, especially with Rhodes grass. It is therefore disturbing to note a decline in the acreage devoted to this crop in Queensland, as shown in Table 1, compiled from the latest figures supplied by the Government Statistician. The only satisfactory feature of the data is the increase in yield which has followed more efficient cultivation and harvesting.

TABLE 1.

LUCERNE FOR HAY AND CHAFF.

	Average three seasons 1937–38 to 1939–40	1947–48	1948–49	1949–50	1950–51	1951–52
Acres	49,232	46,798	40,331	41,455	33,947	29,791
Tons	83,855	103,356	92,818	98,484	87,177	67,106
Tons per acre	1·7	2·2	2·3	2·4	2·6	2·3
Lucerne for Green Fodder.						
Acres	57,582	34,315	42,012	44,076	43,918	46,828

Greater use of lucerne could be made by stock-owners in all suitable districts, particularly as production can be so effectively mechanised.

Increased interest in lucerne growing has been reported from most agricultural districts lately, but much expansion is needed before even the pre-war acreage is attained.

Tobacco.

Overall growing conditions were generally good, but shortage of irrigation water was a problem in November and December in parts of the Mareeba area, where later heavy rains were also detrimental to early planted crops. Unstable prices and inability to dispose of some leaf perturbed the industry, and North Queensland plantings decreased by about 600 acres in 1952.

Continued interest was displayed in oil burners for curing, and units using either dieselene or lighting kerosene as fuel were operated in all the main centres of production. Further units will be installed, but where ample firewood is available, costs will be a deterrent to general adoption.

Over 1,200 oz. of tobacco seed produced by the Department was sold to tobacco growers, Gold Dollar and Hicks continuing to be the varieties most in demand. Seed stocks of all popular varieties were maintained, and supplies of Virginia Gold, a new variety which has done well in trials, are available for the 1953-54 season.

Other work on tobacco is discussed under the heading of "Tobacco Experiment Farms."

Cowcane.

The varieties Co.301, C.P.29/116 and A.130 have proved outstanding throughout the Caboolture trial. Yields of green material have dropped considerably from those recorded for the plant cane, despite annual fertilizer applications, but over 20 tons of fodder per acre are being obtained from these three varieties as second ratoons.

Additional trials have been established at Bundaberg, Boonah and Mount Larcom. Elephant grass, which shows definite promise as a hardy fodder plant, has been included for comparison.

AGROSTOLOGY.

Interest in pasture improvement from the point of view both of management and of the establishment of new species has increased. Features of this increased interest are the large numbers of enquiries received from pastoralists and the demand for advice and assistance in the establishment of irrigated pastures. Once again most of the phenomenal growth of summer pastures went to waste. The annual loss of the millions of tons of potential hay from those pasture lands capable of being mown is a recurring calamity.

The Australian Dairy Produce Board has assisted financially to maintain more pasture trials on dairy farms. There are now 110 dairy pasture trials in operation on 93 farms and country State schools.

Special attention has again been focused on buffel grass (*Cenchrus ciliaris*). The success of this species on the so-called red desert soils of the central-west and on the harder types of country in the north-west is noteworthy. Detailed observations have revealed the ability of buffel grass and green panic (*Panicum maximum* var. *trichoglume*) to persist during drought under hard grazing on poor soils in the Kingaroy district. Large-scale plots of these grasses and Rhodes grass (*Chloris gayana*) alone and in combination with lucerne and phasemy bean (*Phaseolus lathyroides*) will enable further information regarding their value to be obtained. Trials on the Darling Downs have shown that Rhodes grass, green panic and buffel grass can be effectively established using grain-growing machinery.

Observations in the Fassifern Valley and on the eastern Darling Downs show that phalaris (*Phalaris tuberosa*) will grow well on heavy soils where moisture is satisfactory. In the latter area there are indications that Wimmera ryegrass can be used and be induced to regenerate successfully. Mt. Barker subterranean clover is also showing promising regeneration on the heavy and medium-heavy black soils and the deep fertile loams of the eastern Downs.

Despite the increasing use which is being made of pasture plants from temperate climates, the most useful species for sown pastures in Queensland are still Rhodes grass, paspalum (*Paspalum dilatatum*), kikuyu (*Pennisetum clandestinum*), green panic, buffel grass, lucerne, white clover (*Trifolium repens*) and phasemy bean, and in the wet tropics, Para grass (*Brachiaria purpurascens*), Guinea grass (*Panicum maximum*), molasses grass (*Melinis minutiflora*), and the legumes centro (*Centrosema pubescens*), puero (*Pueraria phaseoloides*) and stylo (*Stylosanthes gracilis*) (Plate 3, page 19).

The Agriculture Branch has collaborated with others in a number of trials. These include the study of funnel ants in pastures on the Atherton Tableland, copper-deficient pastures at Mooloolah, Rhodes grass-lucerne mixtures on brigalow soils at Inglewood, Kingaroy and Biloela, and the spectographic analysis of paspalum and mat grass pastures of the Near North Coast for levels of trace elements. Seven trials, including pilot plots, fertilizer and trace element trials and a grazing trial, are established on pastoral properties.

Pasture Improvement.—During the year 33 pasture species, comprising grasses and legumes, were introduced and grown in quarantine. White clover selections from old stands in south-eastern Queensland have shown marked variations in yields, and some strains take 30 days longer to flower than others. Some may be better suited to Queensland coastal conditions than those now commonly grown. Plant nutrients and new strains of Rhizobium are being examined in relation to the improvement of nodulation in clovers sown on sandy loams and podsolized soils of large areas in south-eastern Queensland. Mowing dense blady grass stands at monthly or three-monthly intervals at Atherton was effective and the mown areas are now carrying good paspalum pastures (Plate 8, page 21).

Exploratory Plots.—Strain differences in buffel grass and green panic were again in evidence. The tropical legumes centro and stylo survived the 1952 winter on sandstone-derived soils at Moggill following top-dressing with 1 cwt. of potash per acre. Molasses grass, buffel grass, green panic and Rhodes grass on such soils develop more productive sown pastures than the existing blue couch grassland.

Fertilizer Trials.—The study of copper-deficient pastures on alluvial soils on the Near North Coast has been continued. Areas treated with lime, superphosphate and copper sulphate carry more clover than those receiving superphosphate and copper sulphate, copper sulphate alone or no treatment. Paspalum has a uniformly higher copper level than mat grass (*Axonopus affinis*).

On the Eungella Tableland on podsolized clay loams, renovation of paspalum pastures, top-dressing with lime and superphosphate and oversowing with red and white clovers have given good results.

On Mt. Tamborine, a kikuyu-white clover pasture on deep red basaltic soils has shown good response to renovation and top-dressing with dolomite, superphosphate, copper sulphate and zinc sulphate. The effects were still apparent in the clover growth two years after treatment.

At Oxley, on a light grey clay loam, pasture top-dressed with lime and superphosphate in 1951, and superphosphate only in 1952, did not respond until 1953, when excellent white clover was produced.

On parts of the Darling Downs, top-dressing in autumn with superphosphate stimulated the growth of burr medics, and the practice could be more widely adopted with advantage in such districts.

Grazing Trials.—Four grazing trials were conducted during the year. In the Gympie district 21 acres of hillside paspalum pasture on a rather infertile loam was subdivided and top-dressed with lime and phosphate. The treated area produced 16·3 lb. per acre more butterfat and carried many more dry stock than similar but untreated pasture during the very dry year which followed treatment.

At Nambour, 2½ acres of paspalum-white clover pasture on dark brown basaltic soil was top-dressed in spring with nitrogen and phosphate. Production increased by 36·4 lb. of butterfat per acre in the four early summer months, compared with production from similar but untreated pasture.

Thirteen acres of clay loam at Conondale was sown to paspalum, red and white clovers and lucerne, and top-dressed with lime and phosphate. During the year ended April, 1953, this sown pasture produced 32·1 lb. of butterfat per acre more than untreated native pasture supplemented by cultivated fodder crops.

At Chinchilla on 9 acres of reddish-brown, sandy brigalow soil, pastures of Rhodes grass, buffel grass, green panic and lucerne responded rapidly to drought-breaking February rains. Production increased by more than 1 lb. of butterfat per acre per day compared with natural pastures in the early post-drought weeks.

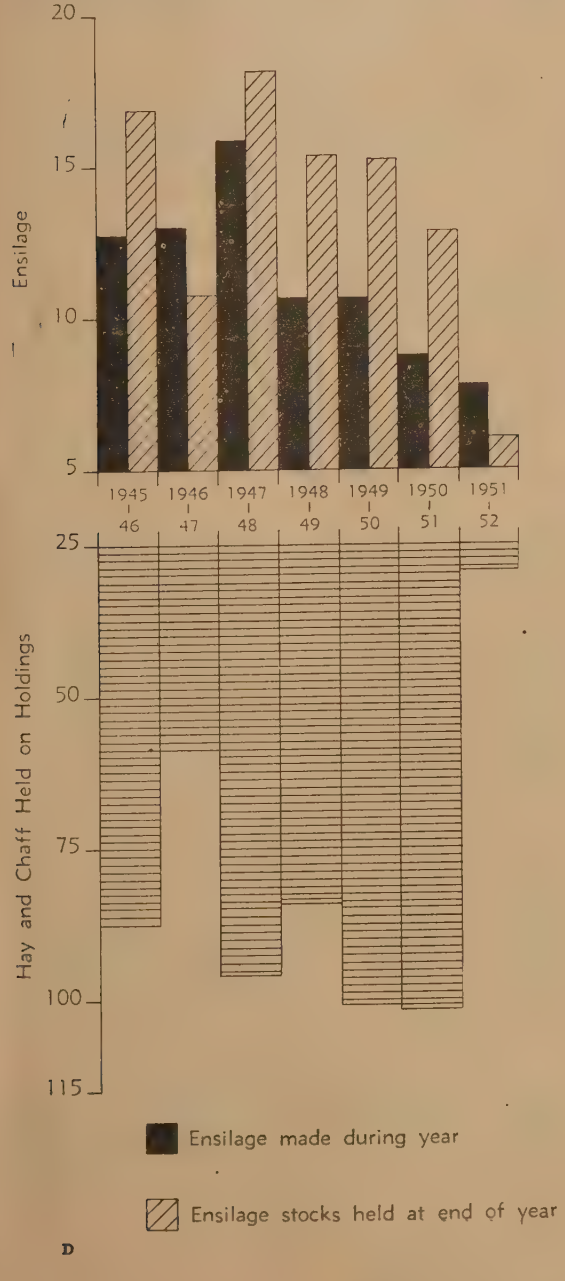
Pasture Protein Levels.—The effects of top-dressing and frequency of mowing on the protein value of pastures are being investigated. On the Atherton Tableland, top-dressing with superphosphate did not improve the clover enough to raise the protein level of the pasture. However, mowing a pasture of kikuyu, paspalum and white clover whenever it reached a height of nine inches gave an average protein level on a moisture-free basis of 9·4 per cent. over a period of 10 months, compared with 8·6 per cent. for plots mown only three times per year and 6·4 per cent. for the unmown control. In south-eastern Queensland, on mat grass pastures yielding 2 tons of air-dry hay per acre from 6 months' growth, comparable results have been obtained in mowing trials.

Irrigated Pastures.—Recent investigations with irrigated pastures have encouraged many farmers to ask for assistance in developing land for the irrigation of sown pastures. Interest is concentrated to some extent in south-eastern Queensland, but extends also into the far north.

One of the difficulties facing farmers attempting to establish such pastures has been the expense of hiring implements such as road graders for the preparation of land. This has been met to some extent at least by the construction of the Johns leveller (Plate 7, page 21), which can be made on the farm from instructions prepared by the Department. Production from those irrigated pastures already established has been very good indeed and they are carrying two dairy cows or beef steers to the acre throughout the year. The following rates of seeding per acre are being used—white clover 2 lb., H.1 rye-grass 6 lb., *Phalaris tuberosa* 2 lb., and cocksfoot 2 lb. The addition of 1 lb. red clover, or alternatively ½-¾ lb. lucerne, is advisable on the less fertile sandy or clay loam soils.

FODDER CONSERVATION.

Assistance in the construction of silos was again available and during the year 11 tower types and five pit silos were built under Departmental supervision and sponsorship. Despite such assistance and much publicity, the position is still far from satisfactory. The reduction in the acreage under lucerne has already been noted in the section devoted to that crop. The figure below shows the trend in regard to fodder reserves (based on Government Statistician's data) for seven years preceding March, 1952.



Queensland stock-owners have never practised fodder conservation on a large scale and the reserves on hand on 31st March, 1952, show how desperate the position in 1952-53 could be even with a short drought. Stock-owners showed more interest in fodder conservation last year, but much greater activity is needed before losses of stock in this State can be held to a reasonable minimum during droughts. The few stock-owners fortunate enough to have adequate fodder reserves on hand in the 1951 drought experienced lower losses in stock and production than the many who were unprepared.

Although there has been apathy towards building up long-term fodder reserves, short-term reserves such as green fodder crops for grazing and cutting have shown a steady but welcome increase. Excluding lucerne, the acreage under green fodder crops has increased steadily from 423,000 acres annually before the war to 557,000 acres in 1951-52. In this respect, too, a more active interest was shown last year in improved pasture management to make better use of pasturage throughout the year.

The creation of fodder reserves to meet the needs of all stock in Queensland for full production during dry periods and droughts would be a tremendous undertaking. But much can be done to build up sufficient reserves to keep stock alive and reduce disastrous losses. There are few areas with a 25-inch or greater annual rainfall where fodder crops cannot be grown. Mechanical equipment is available to facilitate fodder production, and, in many closely settled districts, the commonsense operation of a machinery pool or the encouragement of contractors could do much to assist.

SOIL CONSERVATION.

Soil erosion during the year has not been extensive, though localised damage was reported from a number of places following high-intensity falls in the late summer periods. These falls were particularly heavy in the Near North Coast horticultural and cane-growing districts and occurred when the soils were already fairly well saturated from earlier rains. In the Woombye area, two landslides resulted in the total loss of soil 15 inches deep over an area of 2 acres. On one farm in the Isis district the estimated loss of soil by erosion exceeded 100 tons per acre.

Extension Activities.—There are now over 1,000 farmers throughout the State actively co-operating with the Department in the application of soil conservation measures, and this number is being added to at the rate of about 300 a year. During the past year mechanical conservation works were constructed on over 5,000 acres of land, the total area protected thereby amounting to more than 10,000 acres. It is estimated that the total area in the State now protected by mechanical means is approximately 40,000 acres. In addition, a much larger area has been protected to varying degree by agronomic methods involving better land-use practices such as conversion of cultivated land to pasture, mulching techniques, crop rotations, and improved systems of tillage.

Improved systems of land use and management designed for the better conservation of the soil are being adopted by farmers on an increasing scale. In many instances land on excessive slopes or subject to serious erosion, or otherwise unsuitable for cultivation, has been permanently retired to pasture. Also, many farmers now temporarily retire cultivation areas to pasture as one phase of a rotational cropping programme aimed at restoring the productivity of the soil. Crop residues are retained as a protective surface mulch on an estimated minimum of 75 per cent. of farms on the Darling Downs. This practice is also increasing in the South Burnett and is evidenced by the increasing use of tined implements there. On the Atherton Tableland the practice of burning stubble is steadily decreasing.

In the Near North Coast horticultural areas, rotational cropping practices involving grass leys are less acceptable because of the small size of holdings and high land values. Here stubble-mulching is not widely adopted because of the susceptibility to frost of stubble-mulched horticultural crops. Some cane farmers retain trash for soil protection, but objections are the higher cost of cutting and opposition by most cane-cutters.

Soil conservation activities have been extended into a number of new areas this year. Interest is increasing in the western Downs, Maranoa, and Callide and Dawson Valleys with the expansion of wheat growing in these districts. Soil conservation activities are being more widely adopted in horticultural districts, particularly in the Stanthorpe, Gayndah and Near North Coast areas.

Cane farmers in the Bundaberg, Childers and Isis districts are seeking the assistance and advice of Departmental officers on an increasing scale.

Project Planning.—A plan of soil conservation control measures for a catchment area in the South Burnett has been completed and submitted to co-operating Departments for approval. Work is proceeding on a contour plan for a second catchment in that district and it is expected that the planning of conservation measures will be completed in the coming year.

The Atherton Shire Council has requested the preparation of drainage plans for two catchment areas. A contour plan has been prepared for one of these and a tentative drainage plan forwarded to other co-operating Departments for approval. The survey of the other is proceeding.

Although no projects have been designed as such on the Darling Downs, progress has been made towards obtaining control of catchment areas by the steady and increasing co-operation of farmers. For example, in the Rossvale catchment near Pittsworth, 14 of the 15 farmers in the area practise conservation farming and the fifteenth has now asked for assistance.

Demonstration Areas.—Following the completion of the mechanical conservation structures on the various soil conservation demonstration areas on the Downs established on the properties of co-operating farmers, the agronomic phase of the conservation plan has been developing. Crop rotations fill a major role in this plan and emphasis is placed on lucerne and pasture leys. Promising results are being obtained with lucerne-Rhodes grass mixtures and with lucerne alone. The possibilities of green panic, ryegrasses and clovers are being investigated.

Successful field days were held on the Millmerran and Pechey demonstrations during the year. The latter farm is now completely under lucerne and pastures, and as long as they continue productive, the farmer will avoid the practice of cultivating for fodder and grain crops.

A field day was held in September at the Mundubbera demonstration farm where the first stage of the conservation plan has been completed and the second—the agronomic phase—is being entered upon.

Field Investigations and Research.—The investigation and research programme was continued at the Kairi and Hermitage Regional Experiment Stations and field exploratory projects associated with extension activities were further developed in various south-eastern districts.

The investigations at Kairi include maize stubble-mulching trials, bank-spacing investigations, land-use trials, and runoff observations. The stubble-mulch trials involve the use of sweep implements designed to cultivate the soil without burying the stubble. Clogging of the tines by the maize stubble causes some difficulty in using these implements, but it now appears that the trouble can be overcome by a preliminary discing to break up the stubble. Rainfall has not been heavy enough to cause serious erosion, but rilling between banks has occurred on the unmulched section. The bank-spacing trial has shown that movement of soil between banks occurs during heavy rainfall irrespective of spacing distances and further indicates the importance of ground cover in holding soil in this area. This was also exemplified in the land-use trial, where, during one period of rainfall, runoff occurred on the continuous maize plot, whereas on the lucerne plot there was no runoff.

A stubble-mulch trial is being conducted on a relatively shallow soil at Hermitage to determine if the retention of crop residues on the surface will have a long-term beneficial effect. This year, deep ploughing gave significantly better yields of wheat (33·8 and 32·9 bushels per acre) than the undercutting (29·5 bushels per acre) and the stubble mulching (28·5 bushels per acre) treatments, with burning of stubble in an intermediate position. The immediate improvement effected in tilth would account for the superiority of deep ploughing. Better results from stubble-mulching can be expected as the soil structure improves under this treatment.

Further contour banks were constructed in the land-use trial, where a short-term pasture will be established to improve uniformity following grading operations. Soil moisture and soil nitrate determination were carried out in conjunction with the stubble-mulch trial, and it appears that there is a correlation between the nitrate status of the soil and the particular treatment applied. A technique for determining raindrop splash effects on soil under various treatments is being investigated, and investigations of plant species which might be suitable for use in soil conservation have been continued. A vigorous strain of kudzu from Atherton is under observation at Hermitage and a species of *Paspalidium* has been selected for testing on waterways.

Exploratory work has continued in south-eastern horticultural and cane-growing districts, where it is hoped to elaborate soil conservation procedures suited to those sections of the State in which orthodox methods are not generally applicable. Information obtained progressively has resulted in some modifications of early designs, but in general the basic approach has proved satisfactory in respect of erosion control and has not presented insurmountable obstacles to crop management.

BUREAU OF TROPICAL AGRICULTURE.

Pastures.—The seventh year of the pasture trial, a very good one for pasture growth, was completed. The stocking rate was continued at 1¼ acres per beast and the management involved alternating periods of 7 days' grazing and 28 days' resting. The stocking rate for next year will be increased to 1 beast per acre.

The main results to date show that Guinea grass combined with the legume centro will form a stable nutritious pasture when grazed under a rotational system. Para grass has proved an aggressive invader of established pastures and is highly palatable to stock. Puero is very palatable to stock but tends to smother the grasses. Its vigorous growth, however, enables it to choke out weeds most effectively.

On the basis of these results, Guinea grass and centro pasture has been recommended for the new settlements opened up recently in the Innisfail area, with para grass and centro for situations where ample soil moisture is available. These pasture recommendations also apply to the whole of the wet coastal belt between Daintree and Ingham.

The bullocks used last year were slaughtered in August, 1952, and averaged 648 lb. dressed weight. The average daily liveweight gain for the year was 1·28 lb. In the first 9 months of the 1952-53 trial the bullocks have averaged a daily liveweight gain of 1·68 lb.

A new 2-acre planting of green panic and *Glycine javanica* was made. The grass has made excellent growth and is tending to smother the legume.

At Utchee Creek, grazing of the 4-acre pastures was commenced in August. During the year three new 4-acre pastures were established. They are Guinea grass and centro, para grass and puero, and green panic and *Glycine javanica*.

Rice.—In a fertilizer trial planted last December and harvested in May, the highest yield was 26 cwt. of paddy per acre from plots receiving 194 lb. sulphate of ammonia and 293 lb. superphosphate per acre. No irrigation was used. The variety, Prelude, again demonstrated its suitability for the area, carrying well-developed panicles and showing only slight lodging at harvest.

The bulk plots of Speculation, Early Niro and Mekeo, planted a month later, and irrigated when necessary, did not mature till June. Yields are not expected to exceed 10 cwt. of paddy per acre.

Tea.—The tea plantation grew well after heavy pruning in April, 1952, and harvesting was recommenced in August. The summer flushing was particularly good. As usual, tea quality was low during the cool months, but good and even excellent tea was produced in the warm months of the season from both mechanically-harvested and hand-harvested samples. It cost 12s. 2d. to hand harvest the equivalent of 1 lb. of commercial tea, compared with 5s. 8d. for mechanical harvesting. In the latter method a modified hedge clipper is being used.

The hedgerow plantings, together with shade trees and ground cover, established in early 1952, made very good progress and may be suitable for treatment in February, 1954. Further hedgerows were successfully established at South Johnstone, but on Kairi Regional Experiment Station transplanting losses were heavy despite mulching and spray irrigation.

Jute and Substitute Fibres.—December-planted kenaf (*Hibiscus cannabinus*) grew to over seven feet high and produced over 16 tons of green stems per acre when mechanical ribboning trials were conducted in April. Later plantings, influenced by length of day, flowered earlier and resulted in shorter growth. The ribboning machine removed the bark as ribbons from the green stems, but the overall costs of fibre production were still too high to warrant commercial growing under Queensland conditions.

In a jute (*Corchorus capsularis*) fertilizer trial, the best yield of 15 tons of green stems (fibre recovery 3·5 per cent. to 4 per cent.) was obtained from plots treated with 485 lb. sulphate of ammonia and 235 lb. superphosphate per acre.

In an observation trial including kenaf, jute and *Urena lobata*, the highest green-weight yield of 20 tons was obtained from a limed, non-irrigated section of kenaf.

TOBACCO EXPERIMENT FARMS.

The establishment of permanent tobacco experiment farms at Parada on the Walsh River, at Millaroo on the Lower Burdekin and near Inglewood on Macintyre Brook was advanced a stage further. The experiment farms at present in use are temporary and will be vacated after the 1953-54 season.

1951-52 Trials.

Mareeba and Clare Tobacco Experiment Farm results, which were not available for the 1951-52 report, are now presented.

Mareeba.—In the variety trial growth was excellent and the returns as shown in Table 2 very good. There were no significant differences between varieties in either yields or values.

TABLE 2.
TOBACCO VARIETAL TRIAL—MAREEBA.

Variety.	Yield of Cured Leaf.	Appraisal Value.	Auction Price.
	lb. per Acre.	£ per acre.	£ per acre.
Bottom Special	1,854	765	887
Big Jim	1,728	700	813
Virginia Gold	1,724	676	807
402	1,718	707	816
Yellow Special	1,699	691	806
Hicks	1,677	706	817
Silver Dollar	1,632	700	799
Kelly	1,612	638	747
Gold Dollar	1,584	675	772
Mammoth Gold	1,548	643	749
Average	1,678	690	801

The main rotation trial was concluded. The chief result was the beneficial effect on tobacco quality noted in the leaf obtained from crops following good growth of Rhodes grass.

Clare (*Lower Burdekin*).—Results from the rotation trial as shown in Table 3 confirm previous experience that good-quality leaf is harvested from plots following Rhodes grass and that leaf of inferior quality is grown on plots after the leguminous green manure Gambia pea. The use of a leguminous cover crop immediately before tobacco appears to be inadvisable on Burdekin Fine Sand.

TABLE 3.
TOBACCO CROP ROTATIONS—CLARE.

Treatment.	Yield of Cured Leaf.	Appraisal Value.
	lb. per acre.	£ per acre.
Tobacco following Rhodes Grass ..	1,146	366
Tobacco following weeds	1,205	342
Tobacco following peanuts	1,221	319
Tobacco following maize	1,201	237
Tobacco following Gambia pea	1,191	184
Average	1,193	290

In the varietal trial (Table 4), Virginia Gold, Broadleaf and 402 were the most impressive varieties. Seed increase of Virginia Gold has been obtained and this variety is now available to Queensland farmers for the first time.

TABLE 4.
TOBACCO VARIETAL TRIAL—CLARE.

Variety.	Yield of Cured Leaf.	Appraisal Value.
	lb. per acre.	£ per acre.
Virginia Gold	1,682	402
Broadleaf	1,554	421
402	1,514	394
Bottom Special	1,417	327
Big Jim	1,414	357
Kelly	1,379	371
Hicks	1,302	332
Silver Dollar	1,301	318
Gold Dollar	1,300	308
Yellow Special	1,239	316
Average	1,410	355

Tobacco was planted on part of the land-grading trial which had carried a cover crop of Rhodes grass and Gambia pea for one year. Areas "cut" in grading produced 1,000 lb. cured leaf per acre, whereas "filled" sections produced 1,600 lb. per acre. However, leaf from the "cut" areas sold at about 7½ per cent. more per lb. than leaf from the "filled" parts.

Results from tobacco on Tootra Sandy Loam indicated that this soil type can be included as suitable for tobacco growing on the Lower Burdekin if over-watering is avoided and adequate drainage is provided.

The night-watering trial was unsatisfactory, but this procedure is very important in a large irrigation scheme and must be further investigated.

1952-53 Trials.

Leaf has not yet been appraised and complete results are therefore unavailable.

Mareeba.—All trials were planted out in late September and subsequently made good growth. A varietal trial, an observational rotation trial, a tobacco sucker control trial (in co-operation with C.S.I.R.O.), and seed increase plots of six varieties were included.

Clare (*Lower Burdekin*).—The rotation trial was continued into its fifth season and another trial to examine the practicability of watering tobacco at night was conducted. In the land-grading trial, variations between "cut" areas (1,478 lb. per acre) and the "filled" sections (1,517 lb. per acre) were much less evident than in the previous year. It seems that cover-cropping with Rhodes grass and Gambia pea for at least two years is necessary to restore graded Burdekin Fine Sand to a fertility level suitable for tobacco growing.

GULF EXPLORATORY FARM.

1951-52 Season.

The late April-early May plantings of sorghums failed because of poor germination due to insufficient soil moisture. Of the plants which germinated, Sudan grass made most growth. The introduced and native pastures dried off rapidly during the dry winter months, but standing Flinders grass, although dry, remained palatable to stock up to October.

By July, lodging in December-and January-planted grain and sweet sorghums was widespread and birds had eaten much of the grain. The crops were grazed off with station cattle in September. The stock relished the feed and made a good clean-up of all residues except those of Sudan grass and Honey sorghum. Stems of the former were very woody and Honey sorghum residue was coarser and harder than the residues of any other sorghum.

The standing-over in the field of summer-planted fodder crops again proved to be an inefficient method of utilising the fodder produced.

1952-53 Season.

After removal of stock, the remaining plant residues were cut up with disc implements and the land prepared in October and November. Preparation was assisted by 313 points of rain in November, 300 points of which fell on November 6 and 7. For the six months prior to November, rainfall (totalling 102 points) was of negligible benefit.

Rainfalls for the summer months, shown in points with the number of wet days in parenthesis, were as follows: December 533 (7), January 1,302 (20), February 504 (13) and March 149 (9). No useful rain was received in April and May, so the total seasonal rain amounted to 2,801 points.

The heavy January rains caused waterlogging of the soil, but by the end of February soil cracks were showing again. The March rains were too light to replenish soil moisture, and by the end of May the surface soil was hard and dry, with deep soil cracks common throughout the experimental area.

Cultivated Crops.—The first main plantings of grain and fodder sorghums were made on 31st December, and further plantings, as well as of cowpeas and pastures, were carried out in the first and third weeks of January. The late crop plantings were made in the first and fourth weeks of March. Trial plantings (4·5 acres) of sown pastures were also made in mid-November.

The December-January plantings gave good germination except in small areas where seed was washed out. Early growth was very uneven, being stunted and of poor colour in lowlying areas due to waterlogging and low soil nitrate, but good on the very slight ridges. Differences in growth were less pronounced as the plants developed to maturity, and soil nitrates became available.

Table 5, based on sample cuts, gives yield data for fodder sorghums. Sudan grass made fair growth but stalks were spindly and foliage somewhat light. A wider inter-row space of 28 in. instead of the 14 in. used may have favoured more leaf production. Of the sweet sorghums, Sugardrip lodged badly in all early-January planted plots, but Saccaline resisted dry conditions well and matured in good condition, showing less lodging than the others. Differences in growth between fertilized and unfertilized sections, although not appreciable early, were quite apparent at maturity.

TABLE 5.
YIELDS OF FODDER SORGHUMS AT WROTHAM PARK, 1952–53.

Variety.	Planted.	Height.	Average Yield of Green Material per acre.*	
			Fertilized.†	Not Fertilized.
		in.	Tons.	Tons.
Sudan	Dec. 31-Jan. 2	91	4·84	3·79
Italian	Jan. 2-6 ..	70	10·69	7·01
Saccaline ..	Jan. 2-3 ..	64	8·47	7·19
Sugardrip ..	Dec. 31-Jan. 3	56	6·18	4·27

* Harvested Mar. 26-Apr. 9.
† 112 lb. superphosphate per acre.

TABLE 6.
YIELDS OF GRAIN SORGHUM AT WROTHAM PARK, 1952–53

Variety.	Planted.	Height.	Average Grain Yield per acre.*	
			Fertilized.†	Not Fertilized.
		in.	cwt.	cwt.
Hegari ..	Jan. 1-2 ..	60	28·1	25·2
Alpha	Jan. 2-8 ..	34	13·7	11·9
Caprock ..	Jan. 1 ..	36	7·8	4·9

* Harvested Apr. 11-20.
† 112 lb. superphosphate per acre.

Yields of the grain sorghums Hegari, Alpha and Caprock, based on sample harvests, are shown in Table 6. The yields varied considerably. Seasonal conditions caused poor stands in some borders, lodging of all varieties occurred in other cases, and in others again the grain split and shed. Birds ruined some crops but in general were not severe until late in the season.

Hegari yielded well in some plots but in others yields were very low. A fertilized crop of Alpha which followed a 1951-52 crop of cowpeas yielded 26·2 cwt. of grain per acre. A notable feature of this plot was the uniform growth of plants and the absence of lodging up to the end of May.

Superphosphate increased yields. This is the first season this effect has been seen on sorghums, although it was previously noted on cowpeas and other legumes as well as on Flinders grass.

Cristaudo cowpeas were planted on 19th January on land which had been treated in 1951-52 with superphosphate, Nauru rock phosphate and a mixture of both to examine residual effects. The cowpeas made sufficiently good growth to smother weeds but green weights were not high. The best growth was made on plots previously treated with 3 cwt. superphosphate per acre (5·30 tons green material per acre), being about twice as heavy as on untreated plots (2·75 tons). Plots treated with 3 cwt. Nauru rock phosphate (2·54 tons) showed no improvement over untreated plots.

The late plantings of March failed. Problems associated with late land preparation, mainly in coping with the heavy weed cover, were acute. A good strike was obtained with Sudan grass and Alpha grain sorghum where trash had been burnt off before planting, and the plants made good progress despite the absence of rain.

Pastures.—In sharp contrast to previous seasons and for no apparent reason, no regeneration of Flinders grass occurred on once-cultivated virgin land. The species which appeared were the native legume *Vigna luteola* and a mixture of poorer-class annual grasses and weeds. *V. luteola* made very vigorous growth throughout the experimental area during the summer, especially on soil fertilized with superphosphate.

Although Flinders grass was absent from once-cultivated land, it made prolific growth on other land set aside for pasture studies. Hay cuts were made on some plots where Flinders was the main species. Best yields (2·38 tons of air-dry hay per acre) came from areas mown for hay in the 1951-52 season, while the yield from plots not previously mown was 1·44 tons. A yield of 1·84 tons of air-dry hay per acre was taken from plots fertilized with superphosphate at 112 lb. per acre, compared with 1·14 tons from untreated grass. Cultivation and burning were very detrimental to the two most important grasses of the local pastures, namely Flinders grass and *Dichanthium fecundum*.

Attempts to regrass cultivated areas with Rhodes, buffel and green panic grasses, with and without lucerne, were only partly successful. Lucerne germinated well in the January-sown borders but most of the seedlings had died out by the end of February. Rhodes grass was a complete failure, but light stands of green panic and buffel grasses were obtained. Both species seeded and a thickening of the grass cover next season can be anticipated.

In the plots of introduced pasture species, molasses grass and scrobic grass failed to regenerate from previous seasons' plantings. Para, Rhodes and buffel grasses and Guinea grass strains all showed some promise, but had dried off by the end of May. Phasemy bean also flourished during the summer and seeded well, but the plants were completely defoliated by the end of May.

REGIONAL EXPERIMENT STATIONS.

Mr. W. G. WELLS, Director of Regional Experiment Stations.

Seasonal conditions at the Regional Experiment Stations have permitted a comprehensive programme of experiments embracing crops and pastures to be conducted. Further steps have been taken to incorporate animal industry studies with the pasture investigations to develop systems of combined plant and animal production in a sound land-use policy for each region. The most important aspects of results obtained in the programmes of experiments are reported either in the following summaries or in the reports of the Branches conducting the investigations. The monthly precipitations for these Stations are presented in Table 1.

TABLE 1.
RAINFALL, 1952–53 SEASON (IN INCHES).

Month.	Hermitage R.E.S.		Biloela R.E.S.		Ayr R.E.S.		Kairi R.E.S.	
	1952–53.	Warwick Means.	1952–53.	Means.	1952–53.	Ayr Means.	1952–53.	Atherton Means.
July	·24	1·80	·59	1·30	·11	·72	·54	1·12
August	1·71	1·40	·65	·61	·14	·57	1·88	·84
September	·48	1·75	2·00	·94	·55	1·20	·64	·74
October	6·96	2·32	3·67	1·94	·23	·85	3·35	·90
November	2·90	2·66	4·21	2·84	1·02	1·51	4·32	2·60
December	1·93	3·50	3·99	3·27	1·19	4·13	1·69	7·02
January	4·43	3·58	6·74	4·23	29·39	10·96	15·67	11·52
February	3·98	3·70	4·55	4·94	8·42	9·53	15·79	11·44
March	1·91	2·60	2·29	2·70	2·16	6·26	9·14	9·08
April	1·19	1·60	·56	1·67	·80	2·78	1·50	4·42
May	1·10	1·48	·61	1·57	·00	1·09	1·19	2·34
June	·00	1·70	·22	1·72	·00	1·48	·77	1·73
Total	26·83	28·09	30·08	27·73	44·01	41·08	56·48	53·75

HERMITAGE.

Although July, 1952, was particularly dry, adequate soil moisture had been conserved from the May and June rains for cereal crop production. Satisfactory germination was obtained in early July and two wet periods in August fostered favourable development of the crops. Dry conditions in December permitted harvesting of all cereal crops, some of which had lodged during November when winds of gale force were recorded after heavy October rains. The summer crops were established under very favourable moisture conditions in November, but the plants exhibited slight stress during December, particularly in sorghum varieties with rather dense stands. However, the remainder of the growing season of these crops yielded good rains and grain sorghum varieties produced well. The absence of suitable rains has prevented normal June sowings of winter cereals.

The Station staff has been supplemented by officers of the Agriculture Branch, to whom facilities have been made available for conducting plant breeding and agronomic studies, entomological trials and soil conservation investigations.

Crops.

Wheat.—Very good yields of wheat were obtained from a range of experiments. Of the early-maturing varieties Spica was outstanding; Lawrence yielded highest in the long-season group. These two varieties and Celebration and Seafoam demonstrated their ability to yield well under conditions of high moisture during the late growing season, and outclassed Gabo, which has been superior in drier years. Puora and Puseas were affected by stem rust to some degree. Young plants of Charter were more affected by frost than other varieties. No frost damage was reported on young plants of either Lawrence or Celebration, the former again exhibiting marked resistance to cold weather. Yields ranged from 30 bushels for Puseas to 44 bushels per acre for Spica and Lawrence.

No significant increases in grain yield were obtained, under the conditions experienced this season, by application of either nitrogenous or phosphatic fertilizers on bare fallows. However, on areas where cowpeas had been ploughed under in late summer and these fertilizers were applied at planting of the wheat, significant increases were obtained over the fallow.

Some 180 bushels of the well-tested new Queensland variety Spica were produced for future commercial plantings. Studies of the plant physiology, mottling of grain and milling and baking qualities of certain wheats are being made by the Chemical Laboratory on material obtained from this Station.

Oats.—Several varieties of oats, including four strains of BVH (Bond x Victoria x Hope), were grown under observation during the season. Under favourable conditions the growth of all types was excellent, but severe lodging occurred in the more luxurious growths during the gale-force winds in November. Seed of Klein, Fultex and Vicland was distributed to farmers in the district, together with small quantities of seed from the four BVH strains.

Grain Sorghum.—A grain sorghum varietal trial and two areas for bulk seed production were sown under very favourable soil moisture conditions. Early establishment was good, but varieties with a thick stand reacted to dry hot conditions experienced in December. Early varieties such as Alpha, Kalo and Early Kalo were most affected by these conditions and consequently benefited less from the wet periods of January and February, when respectively 4·43 and 3·95 in. of rain were recorded. This rain was much more effective for the slower-growing varieties such as Plainsman, Wheatland and Hegari, and the mid-early variety Martin also profited more than the early types. Stem branching was evident during March, being particularly heavy in the previously checked Alpha but not present in the long-season varieties. Observations on root development of Alpha indicated that the roots penetrated to a depth of 48 in. in 65 days after planting. Supplies of nitrate-nitrogen were exhausted in the second, third and fourth foot of soil during the maturation period of the crop. Yields in bushels per acre were Martin 88, Early Kalo 84, Plainsman 83, Kalo 77, Wheatland 74, Alpha 72 (somewhat excessive stand), Hegari 49. Bulk areas of Alpha and Kalo for seed production yielded up to 90 bushels of grain per acre.

Other Crops.—A trial of 25 hybrid maize selections was conducted in conjunction with the plant breeding staff of the Queensland Agricultural High School and College. Selection of pumpkin strains free of boniness, and lucerne fertilizer trials, were continued, seed multiplication of strains of Brown Beauty beans was carried out for the Horticulture Branch, while the Agriculture Branch had strains of linseed under observation.

Pastures.

Pastures have been established for sheep grazing. They consist of lucerne alone and in separate combinations with Phalaris, prairie grass, brome grass and New Zealand perennial ryegrass sown in cultivated rows. Pasture plots of other species are also under observation to determine yield and palatability.

Nursery.—More than 100 species and strains of grasses and legumes are under observation. Rhodes and green panic grasses are still outstanding during the summer period, and *Bromus inermis* and *B. carinatus* continue to show promise during the winter months. Growth of most other grasses has been unsatisfactory during dry winters, and the performance of legumes other than lucerne during this past summer and winter has been disappointing. A good summer legume, excepting lucerne, has still to be found, but for the winter season Louisiana white and Ladino clovers are giving some indication of persistence. Seed was collected from all important species in the nursery for trial plantings at other centres.

BILOELA.

Very favourable climatic conditions prevailed during the 1952-53 season until the end of March, but lack of useful rains in the autumn has prevented the normal planting of winter cereals. Good rains in April and May, 1952, provided subsoil moisture to field capacity to a depth below six feet in many areas. Suitable rains in June, 1952, started off the cereal plantings very satisfactorily, and establishment conditions for the following summer crops were especially good. In contrast with the previous dry season, only limited irrigation was necessary during the 12 months under review.

Crops.

Oats.—No outstanding differences were obtained in the hay varietal trial. Sizeable seed increase areas of Vicland, Fultex and Klein varieties were grown to provide foundation stocks for local farmers.

In a cereal grazing trial, distinct palatability preferences were shown by horses in the following declining order of attractiveness:—Warput wheat, Skinless barley, Lawrence wheat, Cape barley and oats (several varieties). Cattle grazing at the same time showed no preferences. The greatest total green yield was produced by Vicland oats, but Lawrence wheat made the best regrowth after grazing, followed by Vicland, Fultex and Algerian oats in declining order.

Wheat.—The regular standard varietal trial was planted early in June on soil wet to a depth of 8 ft. Only a total of 1·44 in. of rain was experienced during the period from a fortnight after planting until the early-maturing varieties were almost ready to harvest (24th September). Good rains occurred from that date to the end of October, but harvesting was completed satisfactorily. Yields ranged from 25 bushels to 36 bushels per acre. They did not reach early season expectations, due to a combination of some frosting at flowering stage, lack of replacement of moisture in the upper soil layers during the early heading stages of the crop, and a severe attack of stem rust. Gabo topped the trial and was also the outstanding variety in the district, non-lodging being a feature of its performance in comparison with all other varieties, which lodged badly, particularly Spica.

Grain Sorghum.—Although ample subsoil moisture was present at planting of the standard varietal trial on 27th November, yields in bushels per acre were only as follows:—Alpha 46, Wheatland 45, Hegari 43, Kalo 40, Martin 38, Plainsman 31 and Early Kalo 31. Apparently the somewhat earlier than normal date of planting for this standard trial subjected the plants to very hot dry weather during the critical head formative stage, when past experiences have indicated that good rains promote high yields. Comparisons of 42 in. and 14 in. row spacings of these varieties favoured the wider spacing, with a general tendency for the quicker-maturing types to benefit more than the longer-season varieties.

Cotton.—The season was suitable for cotton, and in spite of a severe insect attack on the early flower buds, the yields harvested have been good, the 45 acres on the Station giving promise of averaging around 1,400 lb. seed cotton per acre. The mean yields of the main experiments (in lb. seed cotton per acre) were as follows:—

(1) Irrigation standard varietal trial on old cultivation—mean yield 1,495 lb. with yields ranging from Acala 4·42 (1,199 lb.) to Coker 100 (1,808 lb.).

(2) Rain-grown standard varietal trial, first year after Rhodes grass—mean yield 1,653 lb. with yields ranging from Rowden (1,553 lb.) to Miller 43-9 (1,826 lb.).

(3) Irrigation entomological trial—no significant differences, but in the comparable rain-grown trial all insecticidal treatments tended to exceed the control (1,128 lb.), with the leading treatment yielding 1,513 lb.

(4) Time-of-irrigation experiment—3-in. pre-planting application exceeded non-application by 211 lb.

(5) Rain-grown cotton in cotton-grassland rotation—control (repeated cotton plantings on old cultivation) 745 lb.; in first year after 4 years of Rhodes grass 1,133 lb.; in third year 1,324 lb.

Miscellaneous Crops.—The normal favourable harvesting weather for both summer and winter crops, plus the installation of supplementary irrigation facilities, provide very favourable conditions for small-scale pure seed multiplication of foundation stocks of a range of crop plants and pasture grasses and legumes. Accordingly the following seed increase plots were grown this season:—Virginia Brightleaf tobacco, a range of soybean varieties, several commercial varieties and also recently introduced strains of cowpeas, strains of linseed, Polestar sunflower, D'Anjou castor bean, strains of wheat, several acres of Alpha grain sorghum, strains of cotton, White Rice popcorn, Giant Setaria, and strains of buffel, Urochloa, green panic and Rhodes grasses.

In a soybean varietal trial the leading variety Nanda produced to 1,051 lb. of beans per acre. The Black cowpea, which has performed well at Biloela for many years, excelled other varieties with a yield of 18 bushels per acre. Although fair yields of castor beans were obtained, the problem of satisfactory mechanical harvesting of this crop still awaits solution.

Lucerne.—Last season's investigations with irrigated lucerne indicated that good yields could be obtained with upwards of 6 in. of water available per cutting. The cost of irrigation made the attainment of high yields uneconomical. Accordingly this season's programme featured irrigation following rain to provide good depth of wet soil rather than irrigation between the rains in an endeavour to obtain maximum yields. Under the good seasonal conditions, yields were satisfactory with this method of irrigation, while cost of production per ton of hay was materially reduced.

Pastures.

Grass Seed Harvesting.—The previous season's investigations of mechanical harvesting of grass seed demonstrated that development of both suitable harvesting and seed-cleaning techniques was required for each species. This season's investigations resulted in the designing of a suitable method for cleaning several species of seed independent of the harvesting operations, thereby simplifying the latter. As a result, a comb stripper type of machine proved very satisfactory in harvesting both Rhodes grass and green panic.

Nursery and Field Trials of Pasture Plants.—The introduction of new species of grasses and legumes continued this season in the search for highly suitable types for testing first in grazing trials on the Station and then in district farm trials. Of the older species, the CG48 strain of Kenya No. 2 Rhodes grass again performed well. This strain has shown remarkable persistence in a planting made in 1940, whereas native grasses have overrun adjacent plots of other strains of this species. Row-cultivated green panic continued to surpass swards, and when grown with alternate rows of lucerne produced high yields with and without supplementary irrigation. The new strain "type D" of buffel grass continued to show excellent promise (Plate 2, page 19). Both row-cultivated scrobic and blue panic, however, have definitely proved to be unsuitable for the Station conditions.

Conservation of the surplus growths of Rhodes grass and green panic that normally occur by mid-season in wet years was attempted by the employment of the wedge type of clamp silo. If this method of silage-making is found to be satisfactory under the normal climate of Biloela and adjacent districts, its general adoption by the dairy-farmers in these areas would have a most beneficial effect on the production of their herds.

AYR.

The year was characterised by a mild, practically dry, first half and a second half with subnormal rainfall in all months except January, which registered 29·39 in. spread over 22 wet days. The summaries of the more important findings of the programme of investigations are presented herein or by the appropriate branches responsible for their conduct. The astonishing cropping possibilities of this district obtainable under the unique combination of a very wet midsummer to provide copious subsoil moisture, supplementary irrigation for the drier periods, and mild winter temperatures, were well demonstrated. During a period covering a few weeks, harvesting of out-of-season summer crops yielded per acre to 2,000 lb. of seed cotton, 1,078 lb. of sunflower seed and 120 bushels of maize, while winter crops such as wheat yielded 40 bushels of good grain and oats yielded satisfactory crops of hay.

Crops.

Cotton.—A varietal trial of some eight varieties planted at the end of February, 1952, following a total of 16 in. of rain in January and February, experienced 7 in. during its growth, and with only one 3-in. supplementary irrigation given early in the spring, yielded up to 2,000 lb. seed cotton per acre, which was machine-harvested. Contrary to past seasons' results, a mid-April planting grew satisfactorily, due to the mild winter temperatures, and with only four supplementary irrigations during the spring and early summer yielded to 2,200 lb. seed cotton per acre. Plant growth was more vegetative than the earlier planting and less suitable for machine-harvesting. Accordingly, testing of possible defoliants was continued, and promising results were obtained with both a dust and a spray formulation. If the results are confirmed in further trials, the use of these chemicals will be adopted in late-summer plantings as routine procedure.

Maize.—The yields obtained in past varietal trials of this crop have ranged from 50 bushels to 93 bushels per acre according to the date of planting, with the best yields being obtained from spring plantings. The hypothesis that deficiency of nitrogen caused by prolonged leaching rains of the wet season might slow up growth of crops planted after the wet sufficiently to make them subject to retarding cool winter temperatures was tested in a nitrogen side-dressing experiment conducted in a February, 1952, planting of Q717, the leading Queensland hybrid for Ayr conditions. In conjunction with a pre-planting application per acre of 160 lb. of Tropic (10:8:7·5) fertilizer and a side-dressing of 200 lb. sulphate of ammonia per acre when the plants were 15 in. high, a yield of 120 bushels per acre was obtained with 3·86 in. of rainfall and 7·75 in. of supplementary irrigation. In an August-planted trial of hybrids and a local strain of Star Leaming on land of moderate fertility and permeability, the Queensland hybrid Q440 led with 57·6 bushels per acre harvested by the end of December.

Sunflower.—The results obtained in the previous season with the Jupiter variety in comparison with Advance indicated that possibly this open-pollinated variety might yield well enough to eliminate the use of Advance, a hybrid requiring a seed production organization. Accordingly, plantings of Jupiter seed multiplication plots were grown in the late autumn of 1952. On 30th March, 1953, a row-and plant-spacing experiment was planted; this has not yet matured but gives promise of yielding satisfactorily.

Castor Beans.—Investigations of the effect of row and plant spacings of this crop were continued. Planted at mid-August the crop yields averaged 8·08 bushels per acre with the best results from 24-in. spaced rows containing 12-in spaced plants.

Wheat.—The promising results obtained during the last two seasons with oats grown for both hay and grain production led to the trial this past winter of 11 varieties of wheats covering a range of types grown in southern Queensland. The yields indicated that the early to mid-season maturing wheats excelled, five varieties of these types yielding better than 35 bushels per acre, Gabo leading with 40 bushels.

Oats.—The Vicland variety has again demonstrated that it is a suitable oat for hay production under Ayr conditions. An area allowed to mature seed showed Vicland to have some possibilities as a seed oat under Ayr conditions.

Linseed.—Only a seed multiplication area of Golden Viking—the leading variety in previous varietal trials—was grown at this centre this season. Moderate yields of seed were obtained, but lodging was fairly prevalent in the tall plants, indicating the necessity for ascertaining the water requirements of this crop.

Pineapples.—In irrigation studies, plant growth and size of fruit were directly proportional to the amount of water applied up to a maximum of 4 in. per month. An application of 2 in. per month during the dry periods of the year appears to be the optimum in commercial practice, however, as fruit from heavily irrigated areas may deteriorate severely in transit. Costs of production in the 8 acres of commercial crop have been somewhat lower than in southern and Central Queensland, but net returns per acre have so far proved highly variable, mainly owing to wastage of fruit during transit to the cannery at either Cairns or Rockhampton. There can, however, be no doubt that the pineapple is a suitable plantation crop for the Burdekin Delta if and when local processing facilities become available.

Pastures.

A further increase in carrying capacity of the irrigated pastures was obtained this season. Only 18 beasts were grazed on the 25 acres during the first season (1950-51). This number increased to 23 in 1951-52, and during the past season 33 beasts were unable to graze the mixed tropical legume and grass pasture closely enough to obtain the desired degree of control of plant growth. Once again the Para grass + centro mixture and guinea grass + stylo mixtures produced the most feed. These mixtures carried 8 bullocks per 5 acres and could have easily carried two more throughout the season except for a period of three weeks commencing at the end of February, when the animals had to be moved to an area with natural shade owing to the climatic conditions. Prior to this season the bullocks have not required shade on the less luxuriant pastures, but apparently the combination of high temperatures and humidity following prolonged wet weather in January promoted such dense growth that during February excessively hot and humid conditions prevailed in the pastures sufficiently to cause the animals extreme stress for the greater part of the day. As a consequence, they not only declined rapidly from the average daily gain in weight of approximately 2 lb. per beast but required shade during most of the day to alleviate the trying conditions. The results demonstrate that on irrigated lush pastures in the Ayr district shade should be provided to protect the cattle from extreme mid-seasonal stress conditions. It is also apparent that the productivity of the leading mixtures is progressively improving as a result of the increased return of nutrients to the soil by the grazing animals and the nitrogen build-up by the pastures.

KAIRI.

The seasonal conditions, as a whole, were only moderately favourable for conducting the programme of investigations at this centre. Rainfall during October and November was satisfactory but in December was subnormal. Consequently, young retarded crop plants encountered very severe competition from the exceptionally heavy growth of weeds and grasses resulting from the prolonged rainfall experienced during January and February. Both crops and pastures reacted very seriously to the extremely dry conditions that prevailed from March to June, inclusive.

Crops.

Maize.—The 1951-52 experiment testing the merits of side-dressings of sulphate of ammonia was harvested in July, 1952. Under the favourable climatic conditions ruling during the critical stages of the experiment, no significant differences were obtained, the mean yield of the control plots being 74·5 bus. per acre. In a repetition of the experiment in the 1952-53 season, yields were low due to the excessive leaching and the heavy weed growth. Treatments with the greatest population of maize plants tended to lead in yield, while side-dressings of 200 lb. sulphate of ammonia per acre applied when the plants were 12-15 in. high only increased yields by 8·3 bus. per acre. The yields obtained from the previous season's bulk plantings once more demonstrated the merits of growing maize in rotation with lucerne and pastures, the maize areas in the rotations producing up to 72 bus. per acre compared with not over 31 bus. on continuously cultivated comparable hillside areas. The 1952-53 yields as a whole

will be lower, however, particularly for any plantings later than December, as the continuously wet weather during most of January caused serious leaching of nitrate-nitrogen. Four very early killing frosts (terrestrial readings down to 25·1°F.) in the last week of May also severely affected late-planted maize.

Oats.—Following the difficulties experienced with weed growth in the April, 1951, plantings of oats, further trials with April plantings were commenced in 1952. As a result of frequent rains after the plantings, broadleaf weeds occurred in large numbers on the old cultivations. Applications of 2,4-D at ½ lb. acid equivalent per acre made during May, while failing to kill all weed growth present, gave indications that on younger material fairly satisfactory kills could be anticipated. The yields, although affected by the dry weather, support the hypothesis that early-April planting of Victand oats is advantageous at Kairi even if such heavy weed growth is experienced that applications of hormone weedicides are necessary.

Wheat.—The very satisfactory yields obtained in previous seasons at Hermitage and Biloela with the Queensland-bred variety Lawrence suggested its testing at Kairi, where rust resistance is desirable for a hay wheat. The crop was planted in mid-May and severe weed competition was experienced by mid-June, but a similar weedicide application as for the oats proved very effective. Although affected by late-June dry conditions, the hay yields were satisfactory and its resistance to rusts demonstrates its suitability for earlier planting than is permissible with other non-resistant hay wheats.

Cowpeas.—The Cristaudo cowpea has once more performed well for green-manuring purposes. As in the previous year, however, grazing trials demonstrated its non-attractiveness for pigs; this was also true for other varieties of cowpea this season, the pigs showing definite preference for kikuyu grass.

Fodder Crops.—The testing of sugar-cane seedlings selected at the Meringa Sugar Experiment Station as possible fodder canes was continued. The severe frosts late in May demonstrated that China and Kairi No. 1 (a seedling retained from previous trials) were very susceptible to such frosts. The promising J337 seedling of previous trials and Co.301 had only the tips of the leaves "fired". A new seedling (M736) was the most frost resistant, suffering only slight damage.

Sufficient material was obtained in the propagation plot of elephant grass (*Pennisetum purpureum*—C.P.I.7838), established last season from a superior type of this species forwarded from Biloela, to plant a grazing trial plot this season for comparison with the available commercial elephant grass. The dairy herd showed marked preference for the new strain when it was grazed three months after planting. Regrowth was good after grazing but was affected to some extent by the May frosts, although recovery was good following a warm showery period during early June.

Miscellaneous Crops.—Land and facilities were again made available to the Horticulture Branch for conducting a test plot of coffee and to the Agriculture Branch for investigations in tea growing and methods of soil conservation.

Weed Control.—Due to prolonged wet weather soon after the pre-emergence application of the weedicides, no significant decreases in weed populations in maize crops were obtained with 2,4-D (either ethyl ester, sodium salt or amine salt) or MCPA (at rates of 1 lb. and 2 lb. acid equivalent per acre). Efficient row cultivation, featured by ridging soil around the row of plants at each operation, substantially reduced weed numbers compared with the weedicide-treated plots which were not cultivated close to the rows. Substantial reduction of weed population excepting crowsfoot (*Eleusine indica*) was obtained with post-emergence applications of all of these weedicides.

Pastures.

Legumes.—Once more several mowings were necessary to control weed growth in the lucerne areas during the main wet season. Such cuttings are mostly spoiled by the weather and in an endeavour to save such material a wedge type of clamp silo was constructed of alternate layers of Rhodes grass and lucerne, using a Paterson buck-rake attached to a light tractor (shown in Plate 5, page 21). If this form of silage-making is successful, it will not only provide a means of increasing the conservation of foodstuffs during the Tablelend wet season but will also supply a valuable protein-rich bulk fodder.

Both the older and last season's established areas of *Glycine javanica* grew satisfactorily during the wet season. All plantings of this tropical legume were frosted, however, except those high up on a steep hill. Based on past seasons' performances, regrowth should commence satisfactorily following early spring storms.

Grasses.—Efforts to establish Rhodes grass in weedy lucerne pastures were again unsuccessful—discing stimulated weed growth rather than assisting the establishment of the oversown Rhodes grass. Ploughing at the start of the wet season may be necessary to overcome the trampling effect of the herd sufficiently to allow of the establishment of the grass in such a pasture. The best results with single-species grass pastures this season were obtained in one-year-established row-cultivated green panic. Guinea grass also performed well, as did Para grass on the lower slopes. The latter is relished by the herd during the lush growing period but does not have the carrying capacity under Kairi conditions of either of the other two grasses. Once again old-established Rhodes grass made poor growth during prolonged cloudy showery weather in January and early February, but it showed marked improvement in hot sunny weather at the end of that month, although it was not as attractive to the herd as the other three species mentioned. However, Rhodes grass and *Paspalum dilatatum* exhibited much better frost resistance than any of the pastures except kikuyu, which was only lightly frosted and made the most rapid regrowth following the early June rains. Young regrowth of all species was much more frost tolerant than older growths.

Animal Investigations.

Facilities for investigations conducted by the Division of Animal Industry were expanded during the season. Calving by Station heifers increased the milking herd to 35, while the total number of stock reached 88 for the season. Some 125 pigs and 616 fowls and 240 cockerels were fed during the season. The more important findings are recorded in the separate reports of the appropriate Branches.

HORTICULTURE BRANCH.

Dr. S. A. TROUT, Director of Horticulture.

In the year under review seasonal conditions have been extremely variable. Good rain fell in May and June, 1952, but extremely dry weather was experienced in the late spring and early summer months. Flood rains were recorded in late summer, but conditions during April and May of 1953 have been extremely dry. Failure of the apple crop forced many Stanthorpe growers into vegetable production, and there were periodic gluts of vegetables in the summer months. Prices for some fruits and vegetables eased, and there is now a greater need for efficient cultural practices than for some years past. This recession in prices has also had a steadying effect on land values, and farms are not changing hands to the same extent as previously.

The establishment of canneries in Rockhampton and Cairns has stimulated fruit production in these areas, but the extent to which the fruit industry will expand there will depend largely on outlets for canned fruits.

PINEAPPLES.

The pineapple industry has now recovered from the severe setback of 1951, when many plantations in southern Queensland were damaged first by frosts and later by drought. The area under crop increased by 500 acres over the last 12 months, and a record production of just over 2,000,000 tropical cases is anticipated for 1953. Although market supplies have been regulated by diversion of the major portion of the crop to the canneries, the prices for fresh fruit have been somewhat lower than in 1952. This recession has been attributed to the greater quantity of canned pineapple now available on the Australian market. The prosperity of the pineapple industry depends largely on overseas outlets for canned fruit, and keener competition is expected from other countries. Efficient production methods will therefore have to be maintained by the industry. Experimental work of a long-term nature followed much the same pattern as previously, with emphasis on plant improvement and cultural requirements.

Plant Improvement.—An increasing number of pineapple growers in southern Queensland have now undertaken some form of mass selection. The responsibility for the multiplication and distribution of selected planting material has been assumed by the Committee of Direction of Fruit Marketing, and its Beerwah farm has now been reorganised for this purpose. A large portion of the total area now under crop there consists of the progeny of selected plants from the Maroochy Experiment Station. In North Queensland, limited quantities of surplus material from Ayr Regional Experiment Station have been distributed to selected growers.

Soil Requirements.—Some 20 years ago the pH of the soil was considered to be an important factor in pineapple production on some soil types, and sulphur was applied before planting to adjust the pH to a level of approximately 5. The expansion of the industry into new areas has shown that the crop can be successfully grown on soils which are not inherently acid. Moreover, in some areas where sulphur applications were formerly used the soil is now too acid even for the pineapple crop. The use of sulphur as a pre-planting dressing is therefore now exceptional.

The fertilizer requirements of the pineapple have been investigated in some of the more important pineapple districts on distinct soil types. The plant crop was harvested in the summer of 1953 from experimental areas established in 1951. The standard fertilizer schedules have usually proved satisfactory, but there are indications that additional potash and perhaps nitrogen can be profitably applied on some types of replant land.

In the wet tropics, the fertilizer schedules recommended for the pineapple crop in southern Queensland usually produce excessive vegetative growth. Rates of application have therefore been reduced, and fertilizer requirements of the plant are assessed from leaf symptoms.

Under some conditions copper deficiency symptoms in the pineapple crop cannot be corrected quickly by the inclusion of copper sulphate in the fertilizer mixture. However, good results have been obtained at Maryborough with a spray containing 5 lb. of copper sulphate and 30 oz. of soda ash in 100 gallons of water.

Time of Planting.—Time of planting has an important bearing on both plant and ratoon crops. The subject has been investigated in Central and North Queensland during the past two years; the results obtained indicate the need for planting when soil moisture and temperature are favourable for growth. In these areas, at least, planting should as far as possible be restricted to the October-March period.

Frost Control.—From time to time pineapple plantations have suffered severe losses from frost damage, and methods of preventing it are therefore of considerable interest to the industry. The efficiency of any frost prevention method depends on inversion strength—i.e., the difference in temperature between air at 40 ft. and at ground level. In order to determine the inversion strength throughout the winter months, special temperature recording equipment has been installed by the C.S.I.R.O. Section of Meteorological Physics at three sites selected by the Meteorological Bureau in the Near North Coast area. Temperature measurements last winter indicated that in some pineapple areas the difference in temperature between the upper and lower slopes of a plantation can be as high as 10 deg. Fahr. At the C.O.D. farm at Beerwah, intensive co-operative experiments in which the Department is participating are being conducted to determine the efficiency of fans and oil burners for controlling frost.

Wastage.—Wastage in the summer crop of pineapples is caused by the water blister organism, which develops during transit if the fruit has been badly handled or broken from the plant. Investigations in conjunction with the Science Branch have shown that very effective control of water blister can be obtained by dipping the fruit in a solution of sodium salicylanilide prior to packing.

Internal discolouration known as black heart causes wastage in winter fruit. Last winter the value of various protective covers fitted on the fruit six weeks prior to harvesting was tested (Plate 10, page 23). Clear plastic bags increased the fruit temperature by 4 deg. Fahr. and reduced black heart wastage by 50 per cent. Woodwool, which is normally used by growers for protecting pineapples during the winter months, appeared to retard maturity, reduce fruit temperature and increase black heart wastage.

Maintenance of Quality.—Outlets for fresh pineapples from the summer crop are restricted to local and near interstate markets, because of the rapid loss in quality which occurs during transit. Loss of quality can often be retarded by dipping the fruit in emulsions or wrapping it in moisture-proof materials prior to packing. In experiments, plastic-type wrappers almost completely controlled weight loss and maintained the fresh, bright, attractive appearance of the fruit for a much longer period.

BANANAS.

The banana crop has recovered rapidly from frost and drought damage which occurred in 1951. Supplies of fruit were below market requirements for some months but are now equal to demand. Nevertheless, the impetus given by an era of high prices still continues, and plantings during the year were again high. During the last 12 months the total acreage has increased from 11,333 to 12,729 and the number of growers increased correspondingly.

The Banana Industry Protection Board reports show that bunchy top has been virtually eliminated in some districts. In an attempt to eradicate the disease, legislative controls over the sources of planting material were tightened up in the Metropolitan and Near North Coast areas and part of the buffer area. In the Nambour district the position has not been so satisfactory, and the inspectional staff was therefore strengthened there.

Demonstration areas designed to test findings from studies on the effect of size of planting material and times of fertilizer applications were established in several districts last year. The results have been particularly satisfactory, and the general adoption of these methods should substantially increase banana production in this State.

Bunch Covers.—During the winter months banana bunches frequently suffer from exposure to low temperatures, which affect both the weight and quality of the fruit. Hessian covers have been used for a number of years by growers to protect the bunches, but as supplies of this material were scarce, clear and coloured plastic covers of standard Welvic film were tried as substitutes. In experiments, these covers increased the weight of the bunch, hastened the maturity of the fruit and improved its external appearance. The red cover gave the greatest increase in weight, and the blue the greatest acceleration of ripening. If bunches fitted with plastic covers are at any time exposed to the sun, the basal hands may be damaged. Such covers cannot yet be recommended for general use during the winter months.

Banana Varieties.—Only a few banana varieties are grown commercially in Queensland. A varietal plot has therefore been established to determine whether other types are of potential value. Their performance is being recorded in the field, while their quality on ripening and their suitability for processing are being determined in laboratory experiments.

Ripening.—Loss of weight of bananas during ripening is approximately 4·5%. As bananas are sold by weight experiments have been conducted to determine whether weight loss could be reduced by treating the fruit with wax emulsions prior to ripening. Reductions in weight loss as high as 30% have been obtained with paraffin-base emulsions. As weight loss is related to the particle size of the protective cover, further investigations with micro-crystalline waxes are now in progress. The wax emulsions have not affected the rate of ripening or the quality of the ripened fruit.

Investigations have also been conducted with ripening accelerators of the hormone type. In commercial practice unsaturated hydrocarbons such as ethylene, acetylene and coal gas are used to accelerate the ripening of bananas, but these substances in excessive concentrations can form explosive mixtures with air. Small-scale trials have demonstrated that compounds of 2,4-D and 2,4,5-T will accelerate the softening but not the colouring of Queensland bananas; commercial tests have not yet been possible.

CITRUS.

Many citrus orchards suffered severely during the dry weather of 1951 and a relatively large amount of off-season fruit has been produced during the past two years. The trees are now resuming normal bearing habits, and seasonal conditions during the current year have been good. An average crop of approximately 500,000 cases is expected to be harvested during 1953.

Cultural Problems.—The short life of many orchards established on apparently good citrus soils is due partly to unsuitable stock-scion combinations and partly to virus diseases transmitted through budwood. The Department controls the supplies of budwood used by nurserymen, and budwood is only cut from trees with a disease-free record. The suitability of the several available stocks for the main commercial varieties is being investigated at the Maroochy Experiment Station and elsewhere. Sweet orange stock is now preferred for citrus varieties other than lemon, but trifoliata stocks are of experimental interest. They possess some resistance to brown rot gummosis and improve the quality of the fruit borne by the scion.

Several new citrus varieties have been introduced from other States and overseas for trial under Queensland conditions. Some of these varieties may mature a crop when only limited supplies of Queensland citrus fruits are available on the market.

At Lawes the experimental orchard now includes a block of seedling mandarins derived from cross-pollinated seed and also the original block of Emperor mandarin budwood. Nucellar seedlings are scheduled for planting in the autumn of 1954 from material raised at Nambour. These seedling trees should be free from any viruses present in the parent tree and may provide a useful source of quality budwood in future.

The citrus seed and budwood distribution scheme worked smoothly during the year, the amount of seed sold to nurserymen being sweet orange 82 lb., rough lemon 63½ lb., and Emperor mandarin 6 lb. These figures indicate the increasing demand for citrus trees on orange stock. Approximately 76,500 buds were used by nurseries; this is a considerable increase on last year's requirements and indicates the strong demand for Queensland-grown trees.

Clean cultivation in winter alternating with a weed cover or green manure crop in summer has been the standard method of soil management in citrus orchards for many years. This practice may be improved—in irrigated areas at least—by a non-tillage system in which low-growing legumes form a major part of the sward. Legumes which are potentially suitable for this purpose have now been established at Gayndah and Howard for observation.

Wastage.—Shed storage of lemons is frequently practised by growers in order to regulate market supplies and to effect partial curing of the fruit. However, losses frequently occur through mould wastage, whilst shrivelling may be excessive. A considerable improvement in condition has been obtained by treating samples of the Meyer variety with a wax emulsion containing sodium salicylanilide.

The latest American method of packing a certain volume of fruit in preference to weight has reduced packing costs in that country. The fruit is fed by hoppers into fibreboard cartons impregnated with a volatile fungicide to control mould wastage during distribution. Some of these impregnated cartons have now been imported for trials in Queensland and their effect on mould growth will be compared with other methods of mould control using fungicidal solutions prior to packing.

Chemical Work.—The effect of rootstocks on fruit quality based on sugar, acid and palatability has been determined on fruit selected from the citrus budwood plot at the Maroochy Experiment Station. Although the plots are not sufficiently advanced to draw any definite conclusions, the type of rootstock does appear to influence fruit quality. The varieties include Washington Navel, Joppa and Valencia oranges and Glen Retreat and Ellendale mandarins on orange, lemon, Emperor and trifoliata rootstocks.

DECIDUOUS FRUIT.

Deciduous fruit growers have had a very mixed season, for many orchards have not yet recovered from setbacks during the previous two years, when first hail and later excessive rain caused considerable damage. Flowering was light in the more important commercial varieties of apple, and the fruit set was poor. The apple crop of 204,754 bushels for 1952-53 was the lowest recorded for many years. Approximately 54,000 young apple trees were planted last season, compared with 64,000 during the previous 12 months. There is an acute shortage of nursery stock throughout Australia and nurserymen are unable to supply Stanthorpe requirements.

Pear production has remained fairly constant at 29,000 bushels. Stone fruit crops were better than average and 173,000 bushels were harvested; in spite of wastage from pests and diseases, much of the fruit was of particularly good quality. A record grape crop of 5,134,000 lb. was marketed from the Downs Division and the quality of the fruit was excellent. Prices were lower than in the previous year but the returns per acre were satisfactory.

Cultural Problems.—Experimental work on deciduous fruits is mainly concerned with nutritional problems in commercial crops and in the green manure crops grown in orchards during the winter months. The utilisation of nitrogen by fruit trees is of particular interest, and attention has therefore been given to the value of materials such as urea which can be absorbed by the foliage when applied as sprays. Although foliage sprays are unlikely to take the place of sulphate of ammonia applied to the soil, the tree responds quickly to the former treatment, and deficiencies can therefore be rectified at critical periods of growth during the season.

Disorders in plum varieties are causing concern. In the Angelina plum, leaf chlorosis is pronounced; premature leaf-fall occurs and the fruit may be too small for market requirements. Some improvement has been obtained experimentally with magnesium sulphate sprays. Tree response, however, is slow and treatment

over a period of three years may be needed before deficiency symptoms finally disappear. Another disorder is affecting young Santa Rosa trees, causing lack of vigour, stunting of the limbs and marbling of the leaves. The response to fertilizers containing superphosphate and soil dressings with sulphur suggests that sulphur deficiency may be involved.

Grape Varieties.—The experimental vineyard at Severnlea continues to make progress. Yield performance under different systems of pruning and spacing will be determined in the main commercial varieties grafted onto the more important phylloxera-resistant stocks. Weed control in the vineyard was investigated, and satisfactory results obtained with a pre-emergence spray of PCP followed by a contact spray containing PCP and diesel oil.

Apple Storage.—Cool storage space in the Stanthorpe district has been increased considerably during the last few years, the total capacity of the 13 stores now being 193,000 bushel cases. In a normal season the greater portion of the Granny Smith and Delicious crop is cool-stored in order to regulate market supplies. Experiments have been initiated to determine the optimum picking date for these varieties when the fruit has to be stored. The work will extend over several seasons. Under normal cool storage conditions the life of the Stanthorpe Granny Smith apple generally terminates in October. The increased capacity of cool stores has focussed attention on methods of extending the storage life of the Granny Smith variety. In this connection very promising results were obtained last season by storing the fruit in gas-tight cabinets containing low concentrations of oxygen and carbon dioxide. Many of the difficulties previously encountered in this type of storage work have now been overcome, and additional equipment has been provided by the Deciduous Sectional Group Committee to enable the storage atmosphere to be controlled automatically.

Chemical Work.—Chemical work on Muscat Hamburg, Waltham Cross and Purple Cornichon grapes from the experimental plot at Severnlea was carried out to determine the effects of rootstock on quality. There were significant differences in sugar content and the date of maturation of the various samples grown on the different rootstocks.

PAPAWS.

Supplies of papaws have been well below market and cannery requirements, due mainly to extensive losses of young plants through dieback in the previous year. Heavy plantings were made in most districts during the autumns of 1952 and 1953, and prospects for the year are bright. A notable feature is the interest now being taken in the crop by growers in Central Queensland since the establishment of a cannery at Rockhampton. At the Redlands Experiment Station, types developed for and suited to the Near North Coast district have performed indifferently. The breeding programme is now concerned with the production of pure lines developed from local strains of known merit, the testing of material introduced from overseas and the development of hybrids from existing pure lines. The aim is to produce types adapted to the main producing areas, preferably with some degree of immunity to ripe fruit rots. Varietal trials are in progress at the Redlands and Maroochy Experiment Stations. In other areas selected types from the breeding plots are being compared with local strains. In view of the increasing factory demand for papaws, varieties tested in the field are evaluated for their suitability for processing.

Ripening.—It is now a commercial practice in southern Queensland to harvest papaws during the winter months in a semi-ripe condition and to ripen them artificially. Although such papaws soften and colour during the ripening treatment, they lack the natural flavour of tree-ripened fruit. The possibility of incorporating artificial flavours in the fruit by injecting volatile and aromatic substances into the ripening room is being investigated. Chemical work on changes during maturation has been continued in order to determine a suitable criterion of maturity.

STRAWBERRIES.

Strawberry plantings in 1952 were heavy and growing conditions were extremely favourable for the crop. As the fresh fruit market was well supplied, factories had to absorb the surplus production. The quantity processed, namely 623 tons, represented 70% of the crop and considerably exceeded last year's factory intake. Despite this increase, factories have been able to dispose of their stocks satisfactorily. Plantings during 1953 were on a reduced scale, but yields should be good, at least in irrigated areas.

Preliminary work on the improvement of the Phenomenal variety was initiated at Redlands in 1951. A number of selected plants of good type was propagated but the differences between the clones are not very marked. Seedling plants derived from Phenomenal may, however, provide useful material for the development of varieties with a shorter cropping period than Phenomenal.

Processing.—Considerable progress has been made during the last few years in developing suitable methods for retaining the flavour and texture of quick-frozen strawberries after thawing. Further improvements depend mainly on the development of varieties suitable for processing.

MISCELLANEOUS FRUITS AND NUTS.

The mango, like many other fruit trees, has shown the after-effects of stress conditions in the previous year. Flowering has been most erratic and out-of-season fruit was harvested in many areas. Increased plantings are recorded in North Queensland and further expansion of the industry can be expected if market and processing outlets are satisfactory. The colour, flavour and texture of mangoes make them particularly suitable for canning or quick freezing. Kensingtons are preferred to Commons because of their uniformity in flavour, lack of fibre, greater canning yield and the smaller amount of labour involved in their preparation. As manual labour is involved in the preparation of the mango, further progress in processing depends on developments in mechanical methods of peeling and slicing.

Little change has taken place in the acreage under the production of Macadamia nuts and further commercial plantings are unlikely until grafted trees become available. The Department has grafted trees for its own orchard from selected stock and scion material, and growers are particularly interested in the outcome of these experiments. Reasonably good results were obtained from side-grafting, but the percentage of takes varies widely in different stock-and-scion combinations. So far grafting has been carried out in the autumn, but better results might be obtained from spring grafting.

The prospects for avocadoes appear to be good, as the fruit commands high prices in southern markets and nurserymen are able to propagate sufficient trees for growers' immediate requirements. Where practicable, Mexican stocks are used, but scion material for the particular types of graft used in the avocado must be carefully selected. Results with tip grafting were inferior to those obtained with a side-bark graft using herbaceous scion-wood—a method introduced by a Queensland grower. Varieties worked on selected rootstocks at the Redlands Experiment Station will be planted out in the field during the spring of 1953. The quality of avocadoes on interstate markets is frequently impaired by their immaturity, and investigations are now in progress to determine a suitable criterion of maturity.

The passion-fruit crop is very subject to soil-borne and virus diseases. These appear to be less severe in the Burnett district than elsewhere and the acreage in that area has increased considerably during the year. Methods of crop management have not been worked out accurately in the past, and current experimental work suggests that fertilizer practices, methods of training the vine and spacing of the plants can be improved.

The quantity of figs harvested in 1953 was 30% greater than in 1952 and considerable difficulty was experienced in disposing of the crop. Approximately 150 tons, representing 90% of the crop, was absorbed by canneries, which use the fruit entirely for the manufacture of jam. Stocks of fig jam have accumulated since 1952 and some other method of utilising the crop must be found if growers' returns are to be satisfactory. Crystallised figs imported from overseas are a popular confection, but their commercial production in Queensland depends on suitable processing methods for our varieties. Laboratory trials have produced an attractive crystallised pack of good texture and flavour.

TOMATOES.

In 1952, the tomato crop was a partial failure, mainly due to target spot. Many varieties also showed abnormalities in growth, which suggest that the plant is extremely sensitive to climatic conditions. As no variety can be expected to do equally well in a wide range of climates, work on tomato improvement is being carried out in many areas. It includes screening trials with a range of local and introduced varieties, the selection and propagation of the more attractive types, their testing in the field and the production of seed for local use.

Certified seed was again produced during the year at Stanthorpe, and all the crops were well up to standard. The demand for seed of certified varieties declined recently because established growers in many districts have made selections for their own use in crops grown from certified strains. The amount of seed produced in 1952-53 was:—Q1, 432 oz.; Q2, 1,300 oz.; Q3, nil (crop failed to comply with standards for freedom from disease); Q4, nil (reserve stock sufficient for present requirements). A Rutgers selection is to supersede Q4; the bush habit of the new strain is more open than that of Q4 and the fruit size is maintained until the end of the peak harvesting period.

Few of the more or less fixed varieties introduced from overseas performed well during the year. Most of the new Hawaiian types proved unsuitable for coastal areas but showed some promise for the cool uplands of the Granite Belt. The Southland variety from the United States, though somewhat inferior in fruit characters to the standard Globe types grown here, is resistant to Fusarium wilt and may prove useful in areas where this disease is troublesome.

Of the partly fixed material, two groups were outstanding. The first of these are strains with the *pimpinellifolium* character for nematode resistance (Plate 13, page 23). Some of these strains now have acceptable fruit quality and one of them, 147, should soon be available for district trials. The second group is derived from a natural cross between Bowen Globe and Q3; some lines produce fruit of superb quality and have plant characters suited to the dry tropics. Selection is continuing in both races.

In some of the more intensively farmed areas near Brisbane, soil deterioration has undoubtedly occurred through unsatisfactory methods of land management. At the Redlands Experimental Station, therefore, the effect of crop rotations and soil conditioners such as Krilium and sawdust on the productivity of the soil is being investigated.

BEANS.

Heavy plantings of beans in 1952 resulted in an oversupply of quality pods on the market during spring and early summer. The varietal position remans unchanged with Brown Beauty the dominant commercial type, although St. Andrews is preferred by some growers in the Gympie area. Several other varieties have been tested during the year. One remarkable feature has been the poor behaviour of New Beauty, which performed well at Redlands three years ago. In areas away from the coast this variety has exhibited a dwarf habit of growth and a tendency to produce inferior pods.

Certified bean seed was again produced in the Kingaroy district in sufficient quantity to meet the requirements of the industry. Sufficient stocks of Strain 17, a selection from Brown Beauty, are now available for the production of certified seed. This strain yields well and is resistant to some bean diseases.

Growth disorders have been common in bean crops, particularly in the Gympie district, during the past few years. A check on the pH of typical bean soils in that area has shown there that the acidity is marginal for the crop, and some spectacular responses were obtained from applications of pulverised limestone or dolomite at rates of 1-2 tons per acre. The full effect of such treatments can only be expected in crops with adequate amounts of organic matter.

OTHER VEGETABLES.

Cabbage growing is less speculative now than it was some years ago, when insect pests were more difficult to control. The most urgent need, at present, is a range of varieties suited to the requirements of particular districts. In coastal areas the older varieties of cabbage are being replaced by types such as Enkhuizen Glory and Utility, which mature rapidly and possess an attractive head. In non-irrigated areas such as Stanthorpe, however, small-headed varieties are less satisfactory, as yields are low if the crop encounters stress conditions. In these areas, Succession and Henderson Succession provide the bulk of the crop.

The cauliflower crop requires careful handling in the field if the curds are to be sound, white and attractive when harvested. Particularly good crops are grown in peaty soils near the coast with little or no irrigation. In these areas, growers use seed selected locally each year from attractive plants with some characteristics of Phenomenal, a mid-season variety. As the market pays a premium for early produce, there is a demand for early-maturing types such as Russian 2A and several Snowball strains (Snowball Early, A, X and Y). Some of these would be grown extensively if reliable seed was available.

The area under lettuce continues to expand. Imperial 615 is still the main commercial winter variety, but Imperial Triumph has performed very well in field trials at Redlands. Pennlake, a new type derived from Great Lakes (one of the standard summer-growing varieties), matures very early, but field results are rather inconsistent.

In the carrot crop, Red Cored Chantenay is still the main commercial type grown, in spite of its susceptibility to motley virus. Osborne Park yields heavier crops, but the internal core quality is generally inferior. Deep-rooted varieties such as Kurnella Intermediate and Top Weight seldom do well in the soil types of the main vegetable-growing areas.

White spirit is gradually taking the place of power kerosene as a weedicide in the carrot crop, owing to the lesser risk of injuring the young plants. In some trials, yields have been reduced by oil sprays, but this may not be of any great significance. Investigations are in progress to clarify the position.

QUICK FREEZING OF VEGETABLES.

Fluctuating prices and periodic gluts of vegetables stress the need for regulating market supplies by processing the surplus production. The fresh appearance, colour, texture and flavour of vegetables are retained more satisfactorily by quick freezing than by canning. Commercial developments in quick freezing, however, depend on the continuity of supplies of suitable varieties grown specially for processing and harvested at the right stage of maturity. Investigations with beans, potatoes, cauliflowers, cabbages, carrots and beetroot have revealed distinct varietal differences in colour, texture and flavour of the quick-frozen pack after cooking. Some varieties preferred for market develop undesirable flavours during storage. Abnormal flavours and discolouration will develop during the storage of frozen vegetables unless they are steam-blanched prior to freezing. The optimum period of blanching varies with the variety of vegetable and requires very careful control. Over-blanching and under-blanching can have a considerable effect on the quality of quick-frozen vegetables.

STORAGE OF POTATOES.

Experiments in association with the Agriculture Branch have been carried out on behalf of the Potato Marketing Board to determine whether market supplies of potatoes can be regulated by storing the surplus production. Samples of Sequoia, Sebago, Exton and Monak were harvested at weekly intervals over a period of four weeks in the Boonah and Gatton districts. Satisfactory results were obtained after a storage period of four months at 45%F., the mean loss in weight being approximately 10% and mould wastage 2%. Potatoes harvested in early December were firmer and more attractive than those harvested earlier.

TROPICAL CROPS.

Coffee plots were established at Kamerunga Experiment Station and at Kairi Regional Experiment Station four years ago. Shade for the young plants and irrigation during stress periods are essential for the crop. In practice, an herbaceous perennial plant such as pigeon pea should be grown with the coffee until the shade trees become effective. Although some plants have flowered, a commercial crop cannot be expected for another two or three years.

Pepper has proved more difficult to handle than coffee both in the nursery and in the plantation. Better results have been obtained with planting material from New Guinea than from Malaya. Plants grown from cuttings *ex* Malaya show juvenile characteristics such as delayed flowering and fruiting.

EXPERIMENT STATIONS.

At the Redlands Experiment Station, an additional 21 acres of land adjoining the original property have been placed under Departmental control, and sufficient ground is now available to meet current requirements. The experimental work is, however, hampered by lack of sufficient water for irrigation in spring and early summer. A second bore has been drilled on a site selected by officers of the Irrigation and Water Supply Commission, and pumping tests have so far been satisfactory. However, Hilliard's Creek must remain the principal source of water, and plans for increasing the storage in this creek are being investigated.

Lack of water has also been a handicap at the Maroochy Experiment Station. The main plantation crops do not normally require irrigation when grown commercially, but dry weather in 1951 disrupted the breeding programme in papaws and physiological studies in other crops. Steps have therefore been taken to provide supplementary irrigation from two dams constructed during the year.

Meteorological stations were established at both the Redlands and Maroochy Stations during the year with equipment supplied by the Meteorological Bureau.

EXTENSION.

Mr. R. C. Cannon (Senior Horticulturist) spent a month in the Hawaiian Islands inspecting pineapple areas and discussing cultural problems with officers of the Pineapple Research Institute, the various pineapple companies and the University of Hawaii. This visit was made possible through the generosity of the Committee of Direction of Fruit Marketing.

The influx to the industry of growers lacking an elementary knowledge of horticulture has made advisory work extremely difficult, as farm visits must necessarily be restricted to growers with special problems. Weekly articles contributed to *Fruit and Vegetable News* and other papers keep farmers informed on matters of current horticultural interest.

Field days have been a feature of advisory work during the year. An innovation has been a series of 3-day schools, three for pineapple growers and two for citrus growers, which were organised in co-operation with the Committee of Direction of Fruit Marketing. They provided a full cover for the crop and included visits to experiment stations and private properties where special features of crop management could be demonstrated.

Visual education is an integral part of extension activities, and over 2,000 growers have now witnessed the screening of films prepared by the Branch.

Keen interest has been maintained by school children in fruit-packing classes conducted in conjunction with the Department of Public Instruction. There are 216 children in the Granite Belt and 80 in the Near North Coast district competing for shields awarded by the Deciduous Sectional Group Committee and the *Brisbane Telegraph* respectively. Individual growers are also being instructed in packing and the staff has been strengthened for this purpose.

TRANSPORT.

Temperature records in refrigerated railway waggons have been taken during transit of a consignment of fruits and vegetables from Brisbane to Longreach to determine the suitability of a particular type of waggon. Attention has also been given to pre-cooling temperatures to ensure that consignments are adequately cooled before loading. Although time-tables have been altered to reduce the period of transit of louvred waggons, considerable self-heating of the load may occur when the waggons are stationary. Self-recording equipment has therefore been procured to take the temperatures of these waggons under the various transit conditions in Queensland.

Fibreboard cartons of bushel capacity are being manufactured in Queensland for experiments on the air freighting of fruits and vegetables to interstate markets. Their collapsibility and light weight should make them very suitable containers for this purpose.

Trial consignments of pineapples were made to Sydney, Melbourne and New Zealand during the peak of the water blister season to determine whether pineapples without tops could be successfully transported over long distances. Fruits from which the top had been removed were treated prior to packing with a fungicide incorporated in a wax emulsion. Although the fruit arrived in good condition, there was considerable market prejudice against the purchase of pineapples without tops. If fruit without tops could be marketed, additional planting material would be made available to the grower and a greater weight of fruit could be packed in the case.

MARKET INSPECTION.

New packing and grading regulations prescribing standards of quality for the more important fruits and vegetables grown in Queensland have been promulgated. The variety of certain fruits and their suitability for cooking or eating purposes must be marked by the retailer on lots offered for sale. The handler is also responsible for any damage to the package or contents caused through faulty loading, stacking or unloading.

Considerable breakdown occurred in shipments of apples from some interstate ports, mainly because of shipping difficulites. Fruit fly and brown rot have been prevalent, particularly in stone fruits, while mould and gas burn occurred in citrus. There were periodic gluts in vegetables, particularly tomatoes and beans, resulting in fairly heavy condemnations. Maturity standards have been observed by grape and citrus growers, many of whom have forwarded samples for testing before marketing their crop. There is still a tendency for growers, particularly in the Stanthorpe area, to by-pass the main markets and dispose of inferior grades through private orders. Such a practice is difficult to police, and the appointment of a growers' committee to investigate faults in the packing of Stanthorpe fruits is therefore welcomed.

OVERSEAS EXPORT.

Light crops of apples, citrus and pineapples coupled with satisfactory local prices have limited overseas export. Small but regular consignments of fruits and vegetables have been forwarded to New Guinea and Noumea. A number of additional pineapple establishments have been inspected and registered for overseas export.

STERILIZATION OF PRODUCE AGAINST FRUIT FLY.

Interstate outlets for Queensland fruits and vegetables have become more restricted following the Tasmanian ban against any fruits and vegetables susceptible to fruit fly infestation. Although recommended spray schedules and packing-house sweating are effective measures, isolated infested fruits may sometimes be found in consignments, especially if fruit fly has been very prevalent. Fumigation of packed cases prior to consignment is the only way of ensuring the complete destruction of any fruit fly eggs and larvae present at the time of packing. Overseas investigations have shown that a 2-hour treatment with ethylene di-bromide at the rate of ½ lb. per 1,000 cu. ft. of air space is completely effective against the Oriental and Mediterranean fruit flies without any residual harmful effects on the produce. Recent work in New South Wales with Queensland fruit fly appears to have substantiated overseas findings, but work under Queensland conditions will be required before this treatment can be recommended here. For this purpose fumigation chambers with constant temperature control have been provided by the Committee of Direction of Fruit Marketing, and work is to be initiated with Valencia oranges of the 1953 crop.

PLANT QUARANTINE.

A special Committee was set up last year by the Commonwealth Government to investigate whether quarantine precautions being taken against the Sirex wood wasp should be intensified, maintained or relaxed. Evidence was taken in all States and forests were inspected in New Zealand, where under some conditions the Sirex attack in epidemic form has seriously reduced the growing stock. The Committee concluded that the Siricid wood wasps were potentially serious noxious pests and that quarantine measures against the entry of the wasps into Australia should be intensified. The Committee also recommended that the Commonwealth Health Department should have available in each major port its own equipment and materials for fumigating or otherwise treating promptly the largest amount of material likely to arrive at any one time. When the Sirex wasp was first detected in overseas shipments discharged at Brisbane, adequate fumigation facilities were available for treatment on a large scale. The Sirex wasp is only one of the pests which quarantine officers have to deal with, and extreme vigilance is necessary to safeguard our primary industries. In this connection, plant quarantine officers have been ably assisted by the Customs and Postal Departments and by shipping and airway companies.

SCIENCE BRANCH.

Mr. J. H. Simmonds, Officer in Charge.

For this report it is convenient to present the work of the three sections of Plant Pathology, Botany, and Entomology separately. The subject matter of the last two is largely the responsibility of the Heads of the respective Sections.

PLANT PATHOLOGY.

Cereals.

In the 1952 wheat crop frost damage was again severe and probably of greater economic importance than parasitic disease. Stem rust was unimportant except in a few areas. Powdery mildew caused considerable leaf damage early in the life of the crop. It was found that there were noteworthy differences in susceptibility to this fungus and the opportunity was taken to assess this feature in a large number of wheat varieties.

Of major importance in the wheat crop was the incidence of root rots. It has been shown that the organism causing greatest economic loss is *Rhizoctonia solani*. This fungus is widespread on the Darling Downs but its attack is most severe under conditions of low soil nitrogen, when an incidence as high as 30% has been noted. Take-all (*Ophiobolus graminis*) was recorded for the first time for Queensland in the Pittsworth district, where it occurred in epidemic proportions in a 200-acre planting of the variety Celebration. While the appearance of take-all in Queensland is serious, its occurrence will probably be confined to soils of lower fertility.

Early plantings of grain sorghum made in October suffered severely from the continued dry weather but were practically free from leaf-destroying diseases. Crops planted late, in February, made good growth but suffered to some extent from leaf diseases such as blight (*Helminthosporium turcicum*), streak (*Xanthomonas holcicola*), stripe (*Pseudomonas andropogoni*) and bacterial spot. Head smut disease (*Sphacelotheca reiliana*) was recorded for the second time only on the Darling Downs in the variety Martin. Evidence is accumulating on the relative susceptibilities of a wide range of grain and sweet sorghums to the various diseases of these crops.

Following advice from the Standards Branch that mould growth (mainly *Alternaria* spp.) on sorghum seed was interfering with germination tests, laboratory trials were carried out with a view to eliminating this trouble by fungicidal treatment. Two trade preparations of thiram and chloranil at a strength of 1 oz. per bushel proved extremely effective in preventing mould development. Agrosan at 2 oz. per bushel was fairly effective, while copper carbonate was of little value. Field trials are now planned to determine whether TMTD can be substituted for the copper carbonate dust at present recommended for the control of covered kernel smut.

Field Crops.

Two experiments were carried out during the year with a view to obtaining fungicidal control of field mould in tobacco. In a preliminary seedbed trial, the outstanding efficiency of benzol vapour applied every third night was well demonstrated. Of the sprays, homemade cuprous oxide, ferbam and ziram were the best. In a subsequent field trial the first two sprays gave a fair degree of control of blue mould, but there was insufficient of the disease present to enable the economics of the treatment to be properly assessed.

Two troubles which have caused much concern in northern tobacco areas are a root rot and a stem rot. The incidence of these cannot be correlated with soil type of drainage, and investigation into their fungal origin is proceeding.

Stem rot of cowpeas (*Phytophthora* sp.), recorded for the first time in the previous season, was again prevalent. It constitutes a serious threat to the future use of the popular varieties Poona pea and Reeves, both of which are highly susceptible. Field and glasshouse experiments have demonstrated the soil-borne nature of the disease and the heavy mortality amongst cowpea seedlings when grown in infested land. Of the large number of varieties tested, the only ones showing a high degree of resistance were Cristaudo and Giant, and it is recommended that these be used where infection is known to be present.

Deciduous Fruit.

Field trials designed to determine the value of some of the newer fungicides for the control of brown rot (*Sclerotinia fructicola*) on peaches and nectarines and scab of pears showed that spraying with thiram is likely to replace older methods of control for these diseases.

Subtropical Fruit.

Two unusual strawberry diseases were recorded during the year. An unidentified species of *Rhizoctonia* was associated with a fruit rot occurring in plantings over a wide area. Berries, which may be affected at any stage of growth, exhibit a dark-brown lesion on the underside of the fruit. This rot advances slowly and does not penetrate the fruit to any extent. Another fruit rot, caused by *Gloeosporium* sp., was responsible for a considerable loss of mature fruit in a limited number of plantings.

An epiphytotic of leaf blight (*Dendrophoma obscurans*) was responsible for partial to complete defoliation of strawberries during December and plant losses were high where irrigation facilities were inadequate. Copper sprays appear to protect unaffected leaves and enable treated plants to survive until rain falls.

Tropical Fruit.

The two banana spraying experiments at Mission Beach, designed to reduce the serious defoliation due to Cercospora leaf spot infection in North Queensland, are now nearing completion and the data are being assembled. In both experiments reduction in leaf spotting in the sprayed plots has been considerable. In the first trial, differences in yield were not apparent, but there should be considerable difference in the second, as bunches on unsprayed plants are ripening without filling.

Heart rot or infectious chlorosis can be a serious disease of bananas in North Queensland. One first-year plantation inspected in December showed a 5% infection, the symptoms at that time being mainly in the heart rot stage. In another plantation examined in February, 30% of the stools were showing the mosaic symptoms. In this case cucumbers had been grown adjacent to the bananas during the winter and at the time of inspection cucumber mosaic was present in pumpkins growing among the bananas. Aphids were known to have been active.

Top rot (*Phytophthora cinnamomi*) of pineapples was common during the winter, particularly in the more shallow soils. Contour planting does not appear to influence top rot incidence. Bedding-up on shallow soil, however, has proved to be of distinct advantage.

A preliminary survey of the present wilt position in Near North Coast pineapple plantations was conducted during the year and investigations have been commenced into the nature of "isolated wilt." This trouble involves the root decay and ultimate collapse of individual plants throughout the plantation.

The mass of data collected in connection with the papaw variety trial at the Redlands Experiment Station has been worked over and a number of conclusions arrived at. There is definite evidence of varietal susceptibility to the ripe fruit rots and to cold injury Severe ripe fruit spotting due to *Gloeosporium* spp., *Ascochyta caricae* and *Phomopsis* sp. has been shown to be associated with those fruit maturing slowly in the early, colder part of the season and with those exhibiting poor ripening qualities. Spotting due to *Alternaria* sp., on the other hand, rarely occurred early in the season and became prevalent from October onwards, when spotting due to the other fungi had commenced to decline.

Vegetables.

Rust is probably the most serious disease with which bean growers have to contend at the present time. Observations have revealed several sources of resistance to this new strain of the fungus, and selection and crossing have been carried out with a view to obtaining a resistant type with acceptable agronomic features. With the object of supplying information to those growers who desired a fungicidal control of bean rust, a number of fungicides were tried on two properties in the Nambour district. Sulphur dust was outstanding in its control of rust development but with the low infection levels existing during these trials yield increases did not follow the same order.

Selection within the Brown Beauty variety of bean of types resistant to Strain 1 and Strain 2 anthracnose is proceeding with some success. In a field performance trial of Strain 1 anthracnose and mosaic resistant selections, some showed considerable promise as commercial types.

Cucumbers were severely affected with downy mildew following the heavy summer rains. The variety Palmetto showed good resistance to this disease but appeared very susceptible to anthracnose, in contrast to the older varieties. In a cucumber fungicides trial conducted at Rochedale, Bordeaux 4:4:40 and copper oxychloride (2:40) gave better control of downy mildew and better yield figures than a number of the newer organic fungicides.

Miscellaneous.

As usual, officers were called upon to handle a considerable volume of routine enquiries and a number of interesting records emanated from this aspect of the work. Amongst these were *Cytospora* sp. associated with girdling and dieback of 20 sugar gum (*Eucalyptus cladocalyx*) trees at Pittsworth. *Pestalottzia funerea* occurred in connection with the extensive dieback of a Cupressus hedge in Toowoomba. *Phyllosticta camelliaecola* Brun. var. *meranensis* Burbak was recorded from *Camellia japonica, Coniothyrium fuckelii* Sacc. from rose, and an undetermined species of *Botrytis* from Gladiolus.

BOTANY.

Approximately 10,000 specimens were identified during the year for various institutions and for visitors and correspondents. Included in these plants were many weeds sent for identification and advice on methods of control. The Sub-Department of Forestry continued to submit large numbers of specimens of timber trees for determination, and school project clubs sought the identification of different plants and information on their economic properties.

Specimens received from other institutions for critical examination included 200 specimens of *Melaleuca* belonging to the broad-leaved paper-barked group from the Government Botanists of Victoria and New South Wales, and a series of specimens, mostly *Eucalyptus* and *Cyperaceae,* from the latter.

Larger gifts of herbarium material included a consignment of 1,400 duplicate specimens of Arnhem Land plants from Mr. R. L. Specht, some hundreds of specimens from C.S.I.R.O., Canberra, and 100 pasture grasses and legumes from New Caledonia. Exchange of specimens was continued with other botanical institutions in Australia, New Guinea, U.S.A., Great Britain and Europe.

Mr. S. L. Everist (Botanist) was one of the Australian delegates to the Sixth International Grasslands Congress in Pennsylvania in August, 1952, and took part in the mid-west tour organized by the Congress. Whilst in U.S.A. he visited several States to study grassland problems and work on weed control. He also attended the Annual Meeting of the American Institute of Biological Sciences at Cornell University and visited various well-known herbaria. From U.S.A. he went to Great Britain, where he spent about three weeks, visiting the Royal Botanic Gardens, Kew, the British Museum of Natural History, the Royal Botanic Gardens, Edinburgh, and a number of research stations. In Holland he visited the Rijksherbarium at Leiden and the Central Institute for Agricultural Research at Wageningen.

In December, at the request of the South Pacific Commission, Mr. Everist visited New Caledonia and Fiji to discuss with officers of the Commission the proceedings at the International Grasslands Congress and to suggest lines of research on grassland problems in the region.

The Section is co-operating with the Chemical Laboratory in investigations dealing with the development of the infertile soils of the south-eastern coastal area. Quantitative work on treated plots was begun to determine changes in floristic composition under different treatments.

Weed Investigations.

During the year the ecological survey of lantana was taken one step further. In response to a questionnaire sent to field officers, 106 replies were received. These were studied critically and from them a map was drawn showing the distribution of lantana in Queensland and a preliminary assessment of its status as a weed. The replies showed that the plant grows along almost the whole of the coastal strip from the southern border to north of Cooktown and is a serious pest in four main regions—from north of Cooktown to south of Ingham; around Mackay; from Mount Morgan to the southern border; and an isolated area on the eastern scarp of the Main Range south of Crow's Nest. It appears that in the south it can become a pest under lower rainfall conditions than in the north. Evidence was also obtained to indicate that where grasses have been planted to replace lantana, no serious soil erosion has followed clearing except in some of the southern districts, and that any usefulness the plant may have is more than offset by its deleterious effects on pasture and stock.

Experiments were continued on the control of Russian knapweed (*Centaurea repens*) with hormone weedicides. None of the treatments was effective in destroying the roots but all caused noticeable reduction in numbers of plants. Greatest reduction was obtained with 2,4-D and mixed esters of 2,4-D and 2,4,5-T. The plots were so overgrown with Urochloa grass after the first spraying that no second treatment could be applied during the season. The problem of how to eradicate this weed remains unsolved and further work is needed.

One important function of the Botany Section is the early identification of plants which may become troublesome weeds if allowed to spread. During the year two such plants came to notice—*Helenium tenuifolium,* a sneezeweed or bitterweed, and *Prosopsis juliflora* var. *glandulosa,* the honey mesquite. The former was sent in from the Brisbane Valley. It had not been recorded previously from Australia but in U.S.A. is known to be toxic and to taint milk. Its presence was reported to the Co-ordinating Board of the Department of Public Lands, which immediately took action to destroy the patch, three acres in extent. Honey mesquite was reported from two places, one on the Darling Downs and one in the Central Burnett. It has been present in both places for some years but on the Darling Downs is beginning to spread onto roads. This plant has reduced the carrying capacity of many millions of acres in south-western U.S.A. and is regarded there as a serious pest. Because the potential danger to grazing country in Queensland is great, eradication has been recommended.

Further progress has been made on the chemical control of brigalow. Mixed esters of 2,4-D and 2,4,5-T applied by aircraft in April, 1951, at the rate of 2 lb. and 3 lb. mixed acid equivalent per acre have killed most of the trees at Cypress Downs (Plate 9, page 21). Many roots remain alive, although they are not healthy. They have not stored any starch in the past season, so they are likely to die in the current winter.

Observations were also made on brigalow sprayed privately in the Brigalow-Chinchilla area. The trees were bearing young leafy shoots at the time of treatment, and showed effects very soon after spraying. Six months after treatment in November, nearly all trees were defoliated and most of the tops were dead. Three new experimental plots in the Brigalow district were sprayed in March with butyl esters of 2,4,5-T in water, in oil-water emulsion and in oil, at $\frac{3}{4}$ lb. acid equivalent per acre. In May these plots were showing signs of damage to leaves and twigs.

Poisonous Plants.

Co-operation was continued with the Division of Animal Industry in investigations of suspected plant poisoning. Numerous suspected plants were identified, rumen and abomasum contents were examined, and on several occasions assistance was given to veterinary officers in the field. Humpyback in sheep was the major poisonous plant problem studied during the year. Widespread outbreaks of this disease occurred in the Cunnamulla, Longreach and Aramac districts in March. Botanical surveys indicated that tar vine (*Boerhavia diffusa*) and quena (*Colanum esuriale*) should be regarded as the most likely suspects. Evidence was also obtained of correlation between rainfall and the onset of the disease, the earliest outbreaks of humpyback occurring about six weeks after the first fall of rain of two inches or more and persisting for a period of up to 3½ weeks. Further work is needed to check these suspicions.

General.

The fundamental work of the Botany Section is of a taxonomic nature and good progress has been made with the revision of a number of groups requiring attention. Three taxonomic papers were published during the year and others are in the course of preparation.

A number of visiting botanists made use of the herbarium to further their botanical studies. These included officers of other Australian institutions and several botanists from abroad. Among the latter was Dr. R. Melville, Australian Botanist at the Royal Botanic Gardens, Kew. Facilities were provided for these visitors and in several cases they were taken into the field by members of the staff.

ENTOMOLOGY SECTION.

Rainfall distribution throughout the year and a mild 1953 autumn were responsible for more than the usual activities of some pests, notably armyworms, cutworms, fruit flies and fruit sucking moths. Locusts also appeared in several localities. As well as attending to the large volume of advisory work arising from these infestations, opportunities were taken for further investigations.

Deciduous Fruits.

The incidence of grape scale (*Eulecanium persicae* (Geoff.)) is still at a low level, and only isolated colonies can be found. Dormant oil spraying has proved effective in destroying heavy infestations of this scale on both vines and stone fruit trees. There was an increased incidence of codling moth (*Cydia pomonella* (L.)) in early summer, but the importance of this pest waned as the season progressed. *Tortrix postvittana* Walk. damaged early plums where crops were not adequately thinned. Mites still continue to be a problem in orchards where spraying is delayed until damage is apparent. After several seasons, profitable work in apple orchards, investigational efforts are now being directed towards pests of grapes and stone fruits.

Fruit Flies.

Spring populations of these pests were evident in many districts and activity persisted to cause fruit losses until June in coastal areas. Activity was recorded also from inland localities. In some crops economic losses were due to inadequate attention to spray programmes, whereas in others the difficulties still to be overcome in years of abnormal infestations were accentuated. Generally citrus orchards were reasonably well protected by spraying. A more comprehensive advisory pamphlet on the practical control of these pests has been prepared. Technical work on fruit flies has been continued, and as the first of a series of reports a Queensland host list was compiled and published.

Citrus.

Fruit sucking moths (*Othreis* spp.) appeared in large numbers in many orchards, remained active for lengthy periods and caused severe damage. The nature of the attack of these pests makes control a difficult problem.

Investigations of gall wasp (*Eurytoma fellis* Gir. and *Eurytoma* sp.) have been maintained. Large-scale field trials against *E. fellis* with cover spray schedules of DDT and dieldrin and with systemic insecticides applied by various methods have been completed.

White wax (*Ceroplastes destructor* Newst.) infestations have been lighter than during the previous two years. Research has been steadily advanced and a revised spray programme against this pest has given encouraging results when used commercially. Field trials concerned with improvement in red scale (*Aonidiella aurantii* (Mask.)) control were established in the Gayndah district and are yielding valuable data.

Over the year, appreciable progress has been made with the field investigation of citrus pests and their economic controls. This is applicable particularly to the scale insects and is due to some extent to the steady work over several years on the bionomics and systematics of these insects. Within the narrower scope of this type of study the stage has been reached where authoritative information on one of the tribes is being prepared for publication.

Tobacco.

At Clare and in some other northern districts, pest populations were large and resultant crop damage was heavy. Southern districts fared better with leaf-eating pests than in the previous season, but nematodes were active and destructive. An intensive and heavy investigational programme was carried through in the Ayr and Bundaberg districts. This included observations on the effects of planting times on pest incidence, and trials designed to yield more exact information on insecticide residues and taints. A large number of insecticides and insecticide combinations were screened. As a result of this work, a new tobacco pest control schedule has been prepared for the 1953-54 season, when dieldrin will be introduced in commercial work.

After observations for five years on a rotation trial and other selected sites it is now becoming apparent that crop rotation has little economic value against nematodes in tobacco fields. Other field work with these pests has been held in abeyance pending improvements in the control of leaf-eaters and borers.

Grain.

Experiments with protectant dusts against stored grain pests have been continued to complete the type of data already obtained, and to connect the conclusions with commercial practices. No new approaches to this problem have been attempted.

Vegetables.

In the Brisbane area the green vegetable bug (*Nezara viridula* L.) appeared in large numbers during early November and October, and concentrated on tomatoes. The bean pod sucking bug (*Mirperus scutellaris* Wall.) caused some crop failures.

Perhaps the most serious vegetable pest during the year was unexpectedly the cabbage white butterfly (*Pieris rapae* (L.)), which though present for many years has not previously been of economic importance in commercial vegetable production in Queensland. Preliminary control trials have been carried out and more critical insecticide investigations are planned for the coming year.

Work with the red spider mites, *Tetranychus urticae* Koch. and *Eotetranychus telarius* (L.), has covered the publication of information collected over a number of seasons in a form suitable for general use, and in evaluating data prior to conducting more field experiments.

Damage to tomatoes by black beetles, *Metanastes vulgivagus* (Oll.) and *Heteronychus sanctae-helenae* (Blanch) are unusual records. Cutworms were prevalent amongst vegetables but not to the extent experienced in some of the field crops. Nematode (*Heterodera marioni* (Cornu) Goodey) infestations were widespread through a large host range.

Grasshoppers and Locusts.

In addition to grasshoppers damaging small crops, swarms of locusts appeared in several districts. For some months *Locusta migratoria* L. caused concern, and some damage to crops in the Callide and several other districts. Many hopper swarms in and adjacent to crops were eradicated with BHC applied as a spray at the rate of 3 oz. gamma isomer per acre.

Cotton.

There were no serious outbreaks of pests in the Burdekin district, but *Heliothis armigera* (Hb.) caused damage in South Queensland. Steps have been taken to intensify investigational work on pests of this crop.

Tropical Fruits.

Claims that white grubs were damaging pineapples in some southern districts were investigated, and it appeared that the actual problem is not primarily an entomological one. In North Queensland, side dressings of BHC were reported as giving satisfactory results against these pests. Trials with deodourised and commercial BHC in soil against scarabaeid larvae, and in contact with growing fruit, have demonstrated so far that under some circumstances aerial application of these materials may cause a typical musty off-flavour.

Long-term trials with insecticides against the banana weevil borer (*Cosmopolites sordidus* (Germ.)) are being continued in southern districts, and similar work is now being undertaken in North Queensland in conjunction with an investigation of white grub damage to bananas. During the year the banana rust thrips (*Scirtothrips signipennis* Bagn.) has been more than usually in evidence where control measures have been neglected.

Insecticides.

There are a number of difficult pest control problems, including that of citrus gall wasp, for which systemic insecticides certainly have an appeal and might be of value. Intensive research with several of these materials against the gladiolus thrips (*Taeniothrips simplex* (Mor.)) and other pests in Queensland has yielded interesting results but few as yet are worth commercial testing. Phytotoxic effects, undesirable residues, health risks and poor pest kills have all contributed to these negative economic results. In some instances more information on methods and timing of applications is required.

Another important investigation which has been undertaken away from the usual insecticide screening trials and commercial schedules is a quantitative study of the phytotoxic effects of insecticide solvents and other non-toxic components of sprays. Tomatoes, cucurbits and tobacco are the test crops.

Miscellaneous Field Crops.

Cutworms (*Agrotis infusa* (Boisd.)) and armyworms (*Cirphis unipuncta* Haw.) appeared from mid-July to October in plague proportions on the Darling Downs, and in other localities in south-eastern Queensland. Although it is estimated that over 10,000 acres of field crops were sprayed, severe damage to cereals, linseed, lucerne and onions was recorded where control measures were not adopted. Insecticide screening and dosage level trials were established. Yields and larval kills clearly demonstrated that DDT at the rate of ½ lb. per acre is the most economical insecticide for the control of these pests in field crops.

Harvesting arrangements and supply problems were responsible for damage by the tuber moth (*Gnorimoschema operculella* (Zell.)) to potato crops throughout the State. Larvae suspected as being *Pantomorus leucoloma* (Boh.) were found damaging potatoes on the farm from which the adults were recorded last year.

Most linseed crops were planted early and had completed flowering before Heliothis was active. On the Darling Downs, the bulk of sorghum sown in early November flowered before midge (*Contarinia sorghicola* (Coq.)) populations developed, although in other districts losses from this pest were recorded. Basic studies on this pest have progressed and give promise of an advance in field controls.

Preliminary attention has been given to ants attacking germinating grain on the Darling Downs, and to the control of lucerne leaf roller (*Tortrix divulsana* Walk.), which caused considerable damage to lucerne in widely separated areas. Projects dealing with thrips (*Thrips tabaci* Lind.) on onions in the Lockyer Valley have been finalised with the conclusion that in general plant injury by this insect does not seriously reduce yields of bulbs or seed in irrigated fields. Insecticide schedules, however, have been formulated for use if and when required.

Field trials against funnel ants (*Aphaenogaster* spp.) have been set out in the Nambour and Ravenshoe districts, and other work on these pests is being continued near Brisbane. White grub damage to pastures has been reported from the Brigalow-Chinchilla area, and from the Atherton Tableland, where the problem of losses is receiving attention. Webworms also caused damage to pastures in several localities, and attacks by *Psara licarsisalis* (Walk.) on lawns and other grassed areas in and around Brisbane were numerous. With these caterpillar pests it is often difficult to decide whether to use insecticides or to rely solely on natural regrowth.

Miscellaneous.

Wider distribution of the chrysanthemum eelworm (*Aphelenchoides ritzema-bosi* (Schwartz) Goodey) within the State has been recorded, and critical work on the control of this pest has been commenced. A more detailed study of Agromyzid leaf miners has been initiated. As the first record in Queensland, the European house borer (*Hylotrupes bajulus* L.) was found in a consignment of imported prefabricated houses. *Nysius vinitor* Berg. has been active in many districts and was reported from linseed, tomatoes, silverbeet, watermelons, pineapples and sorghum. Heavy infestations of *Monolepta australis* (Jacoby) occurred in several districts. The auger beetle (*Bostrychopsis jesuita* (F.)) was found tunnelling into a papaw trunk and boring into a rubber garden hose. An appreciation was made of the present status of the Kauri pine thrips (*Oxythrips agathidis* Morr.), which is still at least a major nursery problem necessitating rigid adherence to a spray schedule. Entomologists co-operated with other departmental officers in lessening the fly problem in and around certain cheese factories. Several hundreds of ant samples and enquiries from widely scattered localities throughout the State have been given attention. None of the species examined was the Argentine ant (*Iridomyrmex humilis* (Mayr.)).

Beekeeping.

Generally, conditions throughout the year were favourable for honey production, and at 31st March there were 893 registered beekeepers in the State. Inspectional and routine advisory work entailed visiting 60 districts and giving attention to 7,881 hives in 229 apiaries. Nosema disease (*Nosema apis* Zander) was recorded for the first time in Queensland in one hive at Yeronga, and an outbreak of American foul brood (*Bacillus larvae* W.) occurred in three hives at Blair Athol. Paralysis and dysentery were observed in a number of apiaries. Wax moths (*Galleria mellonella* (L.) and *Athroia grisella* (F.)) continue to cause heavy damage in stored beecombs when adequate control measures are not taken.

Attention was also given to suspected poisoning by E.605 (parathion) dust following heavy adult mortality in 434 hives in two small-crop areas near Brisbane. This problem was solved satisfactorily when the amount of active ingredient in these dusts to be used in Queensland was limited to not more than 0.3%.

Fauna and Flora Protection.

During the year, three sanctuaries comprising 14,766 acres were declared; one of these is a pelican rookery at the mouth of the Staaten River.

A further 47 honorary protectors and three honorary rangers were appointed. Five prosecutions for shooting on sanctuaries, trapping protected marsupials and shooting protected birds were recorded, and minor breaches were corrected by warning the offenders. In all, eight firearms were confiscated.

Regulations and schedules under *The Fauna Conservation Act of* 1952 have been completed.

CHEMICAL LABORATORY.

Dr. M. White, Agricultural Chemist and Biochemist.

The year under review was notable for a further step in the programme of decentralisation and for the amount of work done in connection with increased production of food.

There are disadvantages in having a laboratory over a thousand miles from the problem which it is attempting to solve and not least is the time lost in transmitting samples—more particularly of biological material. The need to have workers see the task at first hand and the overcrowding from which the parent laboratory was suffering led to the formation of auxiliary laboratories. From rural considerations a 400-mile spacing seems at present most suitable and the two laboratories now being developed in North Queensland, one at Atherton and the other at Ayr, meet these requirements. Central Queensland is the next logical choice. These centres will be concerned primarily with soil-water-plant relationships but will later include livestock. A further rearrangement has taken place at Head Office: the two biological chemistry groups—Toxicology and Biochemistry—are now housed at the Animal Health Station, Yeerongpilly.

Several noteworthy contributions to land industries have been made. The long-term programme on fluorosis, the water-borne "excess" disease which affects teeth and bones of animals, has been completed and papers covering details of the work and recommendations arising from it are in press. It has been shown that the only feasible approach to mitigation or prevention is through livestock management. Provided animals are protected from fluorided waters for some months after birth and are thereafter only intermittently exposed to such waters, they will show no ill effects at maturity. When fully grown the exposure may be extended. This procedure, if adopted in all endemic areas, should increase the sheep population of Queensland considerably. It will call for greater surface catchment and storage on badly affected properties—a provision that prudence alone commends.

Studies on copper deficiency in soils, plants and animals have been extended, and some idea of the importance accorded this work can be gauged from the fact that over twelve hundred estimations were made on livers and blood alone. New areas in which the trouble is acute and others in which it is present in a mild form have been examined. It is worth noting that plants and animals in a large area south of Brisbane showed the classical signs of the malady. These were confirmed by analytical data and proof was finally established by the dramatic response to copper administration.

The gross signs which plants exhibit when micronutrients are lacking are becoming well known, but those which result from excess of these nutrients are not. Manganese toxicity in beans was correctly diagnosed and from experiments on the suppression of manganese availability it now seems possible to rehabilitate an important vegetable-producing area.

From earliest settlement in Queensland the well watered but comparatively infertile strip of coastal land in southern Queensland known as the wallum has attracted attention. An area of over four million acres with obvious climatic and geographic advantages is involved. The Chemical Laboraory has undertaken the substantial programme aimed at defining the major problems of the four main soil types and instituting the appropriate countering investigations. Suitable land has been secured and the work has begun.

Findings of interest from the year's work have been selected and are set out under sectional headings.

BIOCHEMISTRY.

Vitamin A.

Green feed is the main source of vitamin A in Queensland. This is often unavailable and suitable hay or other locally produced sources may not be adequate. Fish liver oils are then used. There has never been a survey to see if the practice should be extended or curtailed, and the laboratory proposed an enquiry. Poultry were selected first and have been studied in some detail. From liver examinations it has been shown that the frank deficiency symptoms correlate well with the liver reserve levels. As there has been no strong evidence that lesser maladies of poultry are influenced by the vitamin A reserves, it is clear that the provision of vitamin A either as a supplement or through adjustment of the feed can be advocated on symptoms alone.

Copper Deficiency.

Steely wool is a good indication that sheep are deficient in copper, but no specific lesion is apparent in cattle, so the tedious procedure of analysing liver samples is employed for both diagnostic and confirmatory work. Almost six hundred estimations have been made. The livers from animals to be slaughtered have given broad clues, while samples taken from living animals have allowed repetitive examination of individuals to check seasonal or induced variations (for example, by medication). Ninety properties have been added to the list. In many cases confirmation was sought through pasture analysis and therapeutic treatment.

Molybdenum excess may give a false indication of copper inadequacy. This complicating factor has already made a hundred complementary analyses necessary, but it is not so general as to affect the mapping of copper-deficient areas.

Fluorosis.

The main programme of experimental work on this disease is now complete and a comprehensive set of papers has been submitted for publication.

Phosphorus.

Deficiency of this element in soils is ultimately reflected in grazing stock. The whole syndrome is well known throughout the world, but confirmation through blood examination is not always clear-cut and the laboratory has long felt that because of the special disabilities of distance a proportion of results are open to suspicion. This has now been confirmed, so the much worked field of circulatory and excretory phosphate is again under scrutiny. Not least among the newer findings is the possibility that specimens other than blood may be used for biochemical confirmation of aphosphorosis.

General.

Estimation of the B group of vitamins has been undertaken in studying certain maladies in pigs. Chromatographic separation of amino acids preparatory to work on protein nutrition has been in progress. Some four hundred estimations of calcium in serum were made in connection with sheep and cattle disorders. Among the lesser but necessary services were food analyses, "gravel" examination and magnesium estimations—all associated with some suspected nutritional disorder in livestock.

TOXICOLOGY.

Early in the first half of the year there was a call for work in connection with insecticide residues on tobacco leaf. Because of the extensive nature of the work, field units were assembled and taken to temporary laboratories in North Queensland. Several thousand samples had to be drawn, prepared and analysed. It was clear from the experience gained that sampling techniques should be studied to determine the minimum number of samples consistent with sound interpretation. This has involved the Section in a major enquiry, which has limited work on other matters.

The usual numerical order in submissions—arsenic, poison plants, lead—was maintained. Interest in thallium poison has been alive ever since this rodenticide was introduced to Queensland, but the first positive finding was recorded this year, when tests showed thallium in the intestine of a dead pig that had had access to thallium rat baits.

GENERAL ANALYTICAL.

The production branches of the Department, stimulated by increased staff and greater field activity, have submitted many specimens of pastures and crops for examination. From experience gained over the years it seems fairly certain that protein content is the key to most fodder evaluations, so the proximate analysis for all major food groups has largely given way to nitrogen assessment only. This has enabled more guidance work to be completed. The main insecticides for ectoparasites of sheep and cattle contain arsenic, DDT or BHC, and these are constantly being checked, but the position with pest destroyers for plant spraying is different. The laboratory has secured physical apparatus to supplement classical chemical methods of examination, and an officer has been detailed from another Section to investigate methods of estimating the newer organic insecticides.

Samples of a dolomitic lime submitted by the Standards Officer were shown to be below standard. In the course of the analyses, enquiry was made into the methods of examination and it was shown that the procedure laid down for high-grade material is not strictly applicable to poor grades. This Section has therefore been engaged in evolving a suitable modification.

CEREAL CHEMISTRY.

A Cereal Chemistry Group of Australian chemists which was formed some time ago sought the co-operation of appropriate institutions in the work of standardising both physical and chemical testing. This laboratory participates and thereby gains valuable information and experience. From the survey of wheat quality in Queensland, the laboratory has been able to gain a number of useful leads on the problem of wheat mottling. During the year officers have plotted progressive changes, both absolute and relative, of a number of chemical constituents in the wheat plant. From the nitrogen metabolism work it seems clear that increased nitrate uptake in the early stages is without effect on the final grain, and that after dough stage no further nitrogen is added to the grain. This finding, taken in conjunction with soil studies, indicates strongly that availability of nitrogen at the flowering stage has an important influence on grain quality.

PLANT NUTRITION.

Soil Survey.

The huge commitments for soil survey work have claimed an increasingly large portion of the staff's time. A detailed survey of approximately 11,000 acres in the Millaroo section of the Burdekin has now been completed so far as the field examination and mapping of soil types is concerned, but many soil analyses have yet to be done. Most of the soils fitted into series already described by C.S.I.R.O. in its general survey of the Burdekin Valley, but the following new series have been named:—Strathalbyn, Barrona, Lanona, and Swan. A report on the characteristics of the various soils has been made to the Irrigation and Water Supply Commission. For land usage the soils have been grouped into five classes. This grouping indicates which soils should be devoted to annual or perennial cropping or to pastures and assists planning and design by the irrigation authorities.

Two additional detailed soil surveys are being carried out, one in the Rocky Creek area near Mareeba and the other at Dalbeg in the Burdekin region. Both are connected with irrigation projects. In order to facilitate laboratory investigations connected with these two large irrigation enterprises, a decentralization policy has been initiated. A laboratory was established at Ayr and arrangements are now complete for the equipping of another at Atherton. These laboratories, apart from serving the immediate needs of soil analytical work for surveys, will enable the study "on the spot" of the soil and plant nutrition problems of two important areas.

In addition to the two main projects mentioned, a detailed survey was carried out at the Inglewood Tobacco Experiment Station, and reconnaissance surveys were made of "Brian Pastures" Research Station, near Gayndah, and Canoe Creek, near Ingham.

Wallum Investigations.

The establishment of a Field Station at Coolum in a stretch of typical wallum country has enabled a systematic investigation of the cropping possibilities of this infertile country to be commenced. To date approximately 25 acres have been fenced, levels taken and drainage operations commenced. An area of 7 acres has been planted to fodder trees, some of which are already making substantial growth. A block of 2 acres is being prepared for horticultural crops, and one for the trial of various pasture species. As a pilot to the Coolum project, a small area of land near Archerfield, on wallum country, has been leased from the Brisbane City Council. This has enabled small-scale experiments on mixed pastures to be carried out; the results of these will be applied at Coolum. Already important leads have been obtained.

Laboratory Investigations.

Studies of manganese toxicity in certain acid red soils devoted to bean growing have advanced a further stage. It has been possible, using pot experiments, to reproduce at will the symptoms obtained in the field, and present indications are that, provided the soil in the vicinity of the plant roots can be maintained at a pH of 5.2 or greater, healthy growth will result.

After years of cultivation with pineapples, these soils sometimes reach a high acidity (pH 4.2), and easily reducible manganese in the soil soars to the extraordinary value of 3,000 parts per million. Values of 2,000 p.p.m. have been obtained in the plant (moisture-free material). Experiments at present being conducted aim at establishing the most economical method of making these soils again highly productive. A satisfactory test for excess manganese in the soil has been developed.

Foliar Diagnosis.

Plant tissue testing for confirming the diagnosis of plant nutritional disorders by visual symptoms is playing an increasingly important part in indicating districts in which micronutrient deficiencies or toxicities may be expected to occur. The most common deficiencies occurring in the metropolitan small-crop growing areas are those of molybdenum and boron. Good indications of boron, zinc and copper deficiencies in tobacco growing in certain areas have been obtained from visual symptoms and tissue tests.

Forestry Work.

Tuition in soil phosphate determinations was given to a member of the Forestry Sub-Department during the year and this has enabled him to take over a large part of the routine soil testing, thereby allowing this laboratory to concentrate more on other forestry problems.

Recently, by the use of polarographic methods it was possible to show that the unhealthy condition of certain hoop pine seedlings in a nursery was due to the absorption of toxic amounts of copper from the soil, which at some previous time had been treated with relatively large amounts of copper salts for fungus control.

Certain waters of borderline quality for irrigation which it is necessary to use at forest nurseries are being analysed at regular intervals and the changes in composition recorded. This has provided data which enable the Forestry officers to cease using such waters for salt-sensitive seedlings when certain critical values are reached.

Preliminary experiments to determine the tolerance of hoop pine seedlings to saline waters were carried out during the year and have indicated the concentrations which should be tried. Arrangements have been made to continue this work during the coming year.

Micronutrient experiments at Passchendaele nursery showed a significant increase in the growth of seedlings from added boron in the presence of copper. No other trace element was beneficial.

Routine Soils and Waters.

In all, 2,500 soil samples and 800 waters were handled during the year. Approximately 1,400 of these were sent in by farmers or field officers, the remainder being concerned with soil survey or specific soil-plant interrelationship problems.

An interesting case of the value of water analyses was recorded this year. During the last dry period, analyses of stock waters in two dams on the one property showed that the salinity of both was high but one was appreciably greater than the other. This information was passed to the grazier and he was asked to co-operate by sending in weekly samples of both waters until the drought broke. This provided information which enabled the grazier to retain his stock on the property throughout the entire dry period by preventing their access to the worst water when the concentration of dissolved solids through evaporative loss became too great. Previously, during severe droughts it had been necessary to send the stock elsewhere.

DIVISION OF ANIMAL INDUSTRY.

VETERINARY SERVICES BRANCH.

Mr. C. R. Mulhearn, Director of Veterinary Services.

Pastoral conditions during the year showed great variation in different areas of the State, the excellent rainfall distribution in the central and southern areas providing a sharp contrast to the severe drought conditions in the north-west, where relief was not afforded until the early months of 1953.

STOCK MOVEMENTS.

Normal stock movements, particularly in the northern section of the State, were below average, due to the failure of the 1952 wet season. Store cattle movements from the breeding to the fattening areas were greatly reduced and were undertaken in many cases as an emergency drought measure rather than routine procedure of moving the stock to fattening country nearer the markets. On the other hand, unusually large-scale transfers of cattle and sheep from the drought-stricken areas were undertaken, resulting in large pastoral areas becoming almost denuded of stock. It is estimated that about 360,000 sheep and cattle were moved from the Julia Creek district alone during the calendar year of 1952. Return of many of these stock after the breaking of the drought created a record northerly movement, and the droving of large mobs of cows and calves from central to north-western Queensland was reminiscent of the pioneering days when the country was first being stocked. Abnormally large consignments of stud and herd bulls have also been despatched to the north-western area. A shuttle rail service was maintained to return sheep from Central Queensland to the country between Hughenden and Cloncurry.

An unusual stock movement which is being organised at the present time is the transfer of cattle by sea from selected areas on Cape York Peninsula to meatworks at Cairns. A landing barge with a capacity of 200 head has been especially equipped for this purpose. The advantage of this method of transport is that cattle will reach the meatworks with little if any loss of paddock condition, as the journey by sea takes less than 48 hours as against five weeks by overland droving over unfavourable stock routes.

Road transport was again used for the movement of several hundred head of fat cattle from Boulia to the railhead at Dajarra prior to trucking to coastal meatworks. This method of transport was also used for the movement of a limited number of cattle across the drought-stricken Barkly Tableland from the Northern Territory into Queensland. The number of cattle introduced from the Northern Territory during the winter and spring of 1952 was the lowest for many years, and several mobs comprised principally breeding cattle which have since returned to the Northern Territory.

An export trade in mixed cattle was developed from North Queensland to New Guinea during the year. A total of 832 head was exported. It comprised 129 head of A.I.S. and 52 head of Jersey cattle transported by air, and 24 A.I.S. and 651 mixed beef cattle transported by sea. These movements were carefully supervised by Departmental officers and animals were tested and certified as being free from cattle tick infestation, tuberculosis, contagious pleuro-pneumonia and brucellosis before a permit for the movement was made available.

Movements across the State's borders are shown in Table 1.

TABLE 1.

TRANS-BORDER STOCK MOVEMENTS, 1952–53.

—	Cattle.	Sheep.	Pigs.
Entered from Northern Territory	27,381	..	..
Entered from New South Wales	31,334	366,491	333
Removed to Northern Territory	16,510	..	..
Removed to New South Wales	296,664	382,167	21,792

STAFF.

The staff position in the Veterinary Services Branch continues to be very acute and it has been accentuated by resignations, retirements and the performance of extraneous duties. Commonwealth quarantine duties involving the regular inspection and treatment of introduced cattle at most inconvenient centres, together with the cleansing, inspection and testing of stock to be exported, have interfered with routine duties of veterinary officers and senior stock inspectors. At the present time there are six vacancies in the veterinary service and 23 vacancies in the stock inspection service. The position has been relieved to a limited extent by the appointment of 13 temporary officers, pending the holding of a stock inspectors' entrance examination by the Public Service Commissioner to permit of permanent appointments.

PESTS AND DISEASES.

The incidence of disease amongst stock has been below average and very few serious outbreaks have been recorded. This was due to the restricted stock movements resulting from dry conditions in the north-western section of the State, where certain of the most important beef cattle diseases are enzootic, and to the even distribution of rainfall over the remainder of the State, which was responsible for maintaining the stock in sound condition. The activities of the field staff in promptly effecting diagnosis and control of contagious diseases and parasitic infestations also greatly assisted in keeping losses from such diseases to a minimum.

The deaths caused by malnutrition associated with drought in north-western Queensland would outnumber by far the combined deaths from all diseases. Diseases of most economic importance recorded during the year include contagious pleuro-pneumonia, tick infestation and tick fever, sterility, tuberculosis and disease of dairy cattle such as mastitis and brucellosis.

Unusual disease problems which were encountered include neo-natal disease in calves in south-eastern Queensland, severe losses in sheep from tetanus following routine surgical procedures, the diagnosis of the sterility diseases of cattle, trichomoniasis and vibriosis, and suspicion of the presence of infectious laryngotracheitis in poultry.

Contagious Pleuro-Pneumonia.

Contagious pleuro-pneumonia must be regarded as the most important infectious disease of cattle in Queensland, due to the losses occurring directly as a result of the disease, the inconveniences and losses due to quarantine restrictions and the high incidence in travelling cattle, and the interstate restrictions on the introduction of Queensland cattle. There has been a progressive reduction in the number of active outbreaks of this disease during recent years, namely 58 in 1950-51, 23 in 1951-52 and 16 in 1952-53. The low incidence this year may be partly due to the restricted cattle movements, but it is also considered that additional control measures which have been instituted during recent years have not been without effect in reducing the number of outbreaks and the associated losses.

Whilst the number of recorded outbreaks may give a general indication of the incidence of this disease, more especially in south-eastern Queensland, it does not give a true picture of its actual prevalence throughout the State. It is known that the disease is enzootic over a large portion of northern and north-western Queensland, whilst more limited infected areas are also recognized in other portions of the State. This fact has been confirmed by the examination of specimens obtained from cattle killed at meatworks and by the testing of blood samples collected from suspected areas.

In the known enzootic areas losses are not great, but the disease continues to smoulder, and thereby maintains a source of infection which may be transmitted by means of carrier cattle to clean areas and be responsible for outbreaks in uninoculated cattle.

In one outbreak of this nature during the present season, there were 186 deaths in a mob of 928 travelling cattle, made up principally of uninoculated yearlings and weaners, with a small group of cows which originated from the enzootic area during the previous year. Losses were not so extensive in other outbreaks, as conditions were not so satisfactory for rapid dissemination of infection and in some cases in-contact cattle had been previously inoculated. Five of the 15 outbreaks occurred in travelling cattle, whilst eight others were in areas into which cattle from known enzootic centres had recently been introduced. In the remaining two outbreaks, which occurred in the Brisbane area, it was difficult to trace the source of infection, but it was considered to be due to the introduction of carrier animals at some previous period. All the outbreaks were promptly brought under control without extension to adjoining properties.

Progress has been made in the general control measures to reduce the incidence of this disease, and an understanding was reached with Northern Territory authorities that all cattle from that Territory be efficiently inoculated prior to the introduction into Queensland, and where practicable this inoculation should be supervised by a qualified Inspector. This arrangement is being implemented during the present season. A condition has also been imposed that all local cattle emanating from or passing through an enzootic area be inoculated prior to such movement.

Observations are being made in co-operation with officers of the Commonwealth Department of Commerce and Agriculture on all cattle slaughtered at meatworks, and any evidence of the disease detected in the slaughtered cattle is being traced back to the station of origin, where appropriate control measures are initiated.

A constant inoculation programme is being recommended in the enzootic areas for all mature cattle handled at mustering times and for all store cattle being turned into the bullock or fattening paddocks.

A veterinary officer has been stationed at Cloncurry and a large proportion of his duties will be assigned to the prevention and control of this disease in one of the principal enzootic areas and in travelling cattle.

Tuberculosis in Cattle.

The incidence of bovine tuberculosis throughout the State can be regarded as being low, as a large number of animals which were tested for the first time during the year recorded an incidence of approximately 1%. However, infections of up to 50% have been recorded in isolated dairy herds from various portions of the State, and this indicates how the disease may assume major proportions, resulting in severe economic loss, if introduced and allowed to propagate under favourable conditions.

This disease has become established in certain large beef cattle herds, where it is a source of serious economic loss. Sixty-nine carcases of beef were totally condemned for generalized tuberculosis at slaughtering establishments in the Cairns stock district during the year, whilst 7% condemnations were recorded from one group of properties in the Townsville district. This high percentage was not confined to an individual draft, but was recorded in several groups of cattle slaughtered at different centres throughout the year. Comparatively high condemnations have also been recorded from beef cattle properties in south-western Queensland. Control of tuberculosis on such properties presents a difficult problem, but tuberculin testing has been carried out, particularly in suspected herds from which stud cattle are distributed; an incidence of 4½% positive reactors was recorded from one such herd.

The Departmental tuberculosis control scheme was extended during the year; the number of cattle included under the testing scheme increased from 300,000 to approximately 400,000, and the number of tests carried out increased from 160,264 to 281,654. Details are given in Table 2.

TABLE 2.

CATTLE TESTED FOR TUBERCULOSIS IN 1952–53.

District.	Number of Herds.	Number of Tests.	Number of Reactors.	Percentage of Reactors.
Southport–South Coomera–Southport	134	9,976	207	2·07
Beenleigh	158	11,034	557	5·05
North Brisbane and Petrie	505	17,822	265	1·48
Moggill–Kenmore	12	756	17	2·23
Samford	27	1,580	10	0·6
Beaudesert	25	971	1	0·1
Beaudesert–Border	135	10,423	180	1·7
Mount Mee	26	2,653	13	0·48
Dayboro'–Mount Mee	55	4,381	23	0·52
Kilcoy	36	2,805	16	0·57
Caboolture	22	1,859	7	0·37
Maleny	23	2,237	17	0·76
Southern Ipswich	4	310	1	0·32
Chambers Flats–Jimboomba	275	12,784	92	0·71
Maroochy Shire	54	2,509	23	0·91
North Ipswich	169	8,139	223	2·7
Boonah	102	4,435	30	0·67
Total for Brisbane Area	86	4,035	75	1·8
Atherton–Townsville	1,848	98,709	1,757	1·77
Rockhampton	146	8,929	38	0·4
Maryborough	134	3,861	110	2·8
Toowoomba	1,832	99,770	891	0·89
Total	1,468	70,385	433	0·61
Grand Total	3,580	182,945	1,472	0·8
	5,428	281,654	3,229	1·14

This scheme was commenced in 1945, when it was applied to milk herds supplying Brisbane and the testing was undertaken by Departmental officers. It has been gradually extended since that date and the services of approved practising veterinary surgeons have been employed. These veterinary surgeons are established in practice in the centres in which they are operating under the scheme. Until 1950 the testing was confined to herds supplying milk, but it was then extended to take in herds supplying milk and/or cream in selected districts. It has since been further extended and at the present time is operating in most of the principal dairying districts of the State from the Atherton Tableland to the southern border. Extensions to the scheme during the year included all suppliers to the Allora, Clifton, and Pittsworth sections of the Darling Downs, cream suppliers to the Booval and Boonah factories in the Ipswich district, all suppliers in the Nambour,

Maryborough and Mackay districts, and milk suppliers to the towns of Home Hill, Ayr, Ingham and Tully.

The objects of the scheme are to minimize the incidence of tuberculosis and its associated wastage in the dairying industry, to provide wholesome disease-free dairy products and to give assistance in the establishment of veterinary practitioners in rural districts. The scheme has been successful, for the incidence of tuberculosis has been reduced from over 10% to less than 1% in the group of herds which have been regularly tested over a period of years, and it has now been possible to extend the period between tests in such herds from one year to two years.

Affected animals detected as a result of testing are slaughtered under supervision and most of such animals in the southern portion of the State are forwarded to the special slaughtering establishment at Goodna, which is maintained solely for this purpose. Positive reactors to the test which were slaughtered at Goodna were subjected to careful examination; 91% were found to have obvious macroscopic lesions of the disease and 9% showed no visible lesions.

Tuberculosis in Pigs.

All pigs slaughtered at bacon factories in Queensland are subject to post-mortem inspection; lesions of tuberculosis are recorded and the farm from which the pigs originated identified. By this means farms on which tuberculosis is present are located and action for eradication can be arranged.

The incidence of tuberculosis in 220,000 pigs slaughtered during the past year was slightly higher than 1%, for 2,026 heads and 728 carcases were condemned for this disease. Systematic tuberculin testing of dairy herds is reflected in this figure, as a comparison with the figure for the year 1942-43 (4.1%) shows.

Tick Fever.

Sporadic cases of tick fever were encountered in most of the dairying districts within the tick-infested area, but the losses resulting from this disease were below normal. The most serious losses were encountered in the marginal areas, particularly in north-western Queensland, where cattle in low condition were exposed to a high degree of tick infestation whilst being mustered and moved away from drought-stricken areas. Deaths amounted to as high as 10% of individual mobs of approximately 1,000 head, but the number of deaths was accentuated by the forced droving under unfavourable conditions. Most losses were due to outbreaks of babesiosis, but anaplasmosis was also diagnosed and was responsible for serious losses in the north-west and the South Burnett areas. Preventive inoculation was undertaken following the forced movement of several groups of cattle from the doubtful areas to the more heavily tick-infested country on the coast. Results from most inoculations were satisfactory but some losses were encountered as the result of severe inoculation reactions.

Several groups of bulls were inoculated under supervision of Departmental officers prior to movement from clean country into the tick-infested area.

Brucellosis.

Brucellosis in cattle was diagnosed in connection with sterility investigations, and it still must be included amongst the most serious diseases of dairy cattle. Whole-herd testing followed by disposal of affected animals is now rarely undertaken in control of this disease, but it was practised during the year in recently infected isolated herds. This form of control is now generally replaced by Strain 19 inoculation, which is practised with the object of building up a resistant herd. Departmental officers carried out further Strain 19 inoculation of calves during the year, but an increasing proportion of applications for these inoculations is now being directed to practising veterinary surgeons. Cases of sterility suspected of being due to brucellosis in cattle inoculated with Strain 19 were investigated, but in most cases there was no indication of loss of resistance and it was established that the sterility was not due to *Brucella* infection.

Sterility Diseases.

Numerous inquiries were received during the year concerning unsatisfactory breeding history in dairy cattle, and it is evident that sterility is of prime economic importance to the dairying industry. This sterility was frequently associated with brucellosis, but in other herds, including a number inoculated with Strain 19 vaccine, this disease was not involved, and on further investigation, using new field techniques, it was ascertained that the sterility was associated with *Vibrio fetus* infection. The extent to which this organism is associated with outbreaks of infertility is not known, but the condition has now been diagnosed from most of the dairying districts in south-eastern Queensland, and it is evident that infection with this organism is more prevalent than was previously anticipated.

Trichomoniasis, another form of sterility, which has been diagnosed on only one previous occasion in Queensland, was detected in three dairy herds during the present year. Appropriate control measures in the form of quarantine of all breeding stock were enforced. This disease is difficult to identify in the field and it is possible that it also may be more prevalent than the four recorded outbreaks would indicate.

An unusual series of deaths in newborn calves occurred in south-eastern Queensland during the spring and early summer of 1952. A proportion of the calves which were fully developed and carried by the dams for the full gestation period were born dead, whilst others which appeared to be quite normal at birth died within 48 hours. The incidence was widespread, affecting both dairy and beef cattle, and up to one-third of the calves were lost on affected properties. The condition was thoroughly investigated, but no satisfactory explanation of the cause of the deaths was determined. It was established, however, that it was not consistently associated with any of the more common forms of sterility or abortion. Other forms of sterility, in which anoestrus or failure to hold to service were the principal symptoms, were found to be associated with conditions such as mineral deficiencies, malnutrition and diseases of the genital tract.

Porcine Brucellosis.

A number of outbreaks of porcine brucellosis resulting in unsatisfactory breeding histories were reported, but this disease cannot be regarded as being prevalent and it is being kept under control by the Brucellosis Tested Herd Scheme. The response to this scheme has been satisfactory and a large volume of testing was undertaken. Certificates were withdrawn from four herds during the year, one on account of the introduction of infection from an outside source and the remainder for failure to adhere to the conditions of the scheme. Applications were received from 22 new herds for inclusion in the scheme. Most show societies co-operated with the Department in that they refused to accept stud pigs for exhibition purposes unless they originated from a listed tested herd. Seventy-nine herds are now listed as having fulfilled the requirements of the scheme.

Leptospirosis.

This disease was more prevalent in dairy herds during the autumn months than during the autumn of the previous year. Most outbreaks occurred in the coastal dairying districts, where a heavy wet season had been experienced, and it appears that there is a definite relationship between the incidence of this disease and the amount of rainfall. Calves were mainly affected and the typical symptoms were fever and haemoglobinuria. A high death rate was recorded in untreated animals. The disease was also suspected of causing severe loss of production in adult dairy cattle following symptoms of fever and acute mastitis. The organism responsible for most outbreaks was found to be *Leptospira pomona*, but *Leptospira mitis* was also suspected.

It has been established that pigs are actively associated with the maintenance and transmission of this disease, and initial outbreaks have resulted from the introduction of affected pigs. This fact is kept in mind when instituting control measures, which aim at isolating affected or suspected pigs and preventing either direct or indirect contact between pigs and calves, particularly during the wet season.

Treatment with streptomycin gave reasonably satisfactory results in calves.

External Parasites

Cattle Tick Infestation.—Cattle tick infestations were light to moderate in most areas during the winter and spring of 1952, but tick populations gradually built up following the wet season in 1953, and infestations have been particularly heavy in the coastal districts during recent months.

Some difficulty in control was experienced in poverty-stricken cattle in the north-western infested area during 1952. Heavy infestations were encountered in several groups of cattle in this area and facilities for treatment were inadequate or non-existent. Deaths from the combined effect of malnutrition and gross tick infestation were numerous, and the problem of handling the cattle was further complicated by outbreaks of tick fever.

In other parts of the State control by dipping and spraying proved effective except in isolated areas where arsenic- and BHC-tolerant ticks were present.

There was a slight retraction of the north-western tick-infested area during the year. Ticks were recorded as far south as Wolgra and Dajarra during the 1951-52 season, but they have now disappeared from this country and the most southerly infestations recorded during the 1953 season were in the Lake Nash-Barkly Downs area. If this position can be maintained during the remainder of the present season, and it is anticipated that this will be accomplished, Northern Territory cattle travelling by rail *via* Dajarra to clean country will take their final treatment at Lake Nash during the 1954 season in place of the present arrangement of untrucking for treatment at Julia Creek.

The heavy infestations associated with favourable conditions for tick propagation were responsible for slight extensions of the infested area in central and southern Queensland. However, active control measures have been brought into operation and ticks have already been eliminated from some of the newly infested areas and they are being adequately controlled in others. The most serious extension of the southern area occurred in the vicinity of Warwick, where quarantine restrictions were imposed and control measures are being rigidly enforced.

Strategic dips at selected points along the principal stock routes and in the cleansing area continue to be maintained by the Department (Table 3). These dips are charged with insecticides other than arsenic and they are utilised for the treatment of travelling cattle to minimise spread of cattle tick and buffalo fly within the infested areas, to permit of a series of treatments to cleanse stock and thereby assist in the uninterrupted movement from infested to clean country, and to minimise the degree of infestation in cleansing areas adjoining clean country. One additional dip was charged and is being maintained in the Boonah district for the final treatment of cattle travelling *via* Cunningham's Gap to the Darling Downs.

TABLE 3.

STOCK TREATED IN DDT DIPS IN 1952-53.

Number of dips charged	47
Cattle dipped	421,561
Horses dipped	4,341

All the selected dips were extensively used with very satisfactory results. For the sixth successive year there were no tick outbreaks in clean country resulting from the movement of travelling cattle after supervised dippings in these dips, and delays at the final clearing dips were infrequent.

Difficulty in maintaining effective control within the tick-infested area by the use of standard arsenical dipping fluids was again experienced, and although arsenic is still extensively used as a tickicide, an increasing number of dips are being charged with other insecticides. Reports from field officers also indicate that tick control by the use of BHC during the year was not so effective as formerly and there is definite proof that BHC-tolerant ticks have developed in limited isolated areas. There is no definite information that DDT is less effective as a tickicide than formerly. It continues to give satisfactory results where the correct concentration of DDT is maintained and dippings are supervised by Departmental officers.

Buffalo Fly Infestation.—The year has been marked by wide fluctuations in the boundaries of the infested area. Following unfavourable conditions for fly propagation in the 1951-52 season, the fly zone receded to north of Gladstone and the road and rail buffalo fly treatment plants were moved back to the Gladstone district. However, with favourable conditions during the summer of 1952, fly populations built up and the fly zone again extended south into the Bundaberg district, necessitating transfer of the treatment plants back to this area. The fly also appeared in the Barcaldine-Longreach area in Central Queensland and action was taken to prevent its extension southward from this country. A continuous survey is being carried out around the southern boundary of the fly-infested zone and control measures are being carried out in this area to minimize extension of the parasite into clean country.

Sheep Lice Infestation.—A survey of the lice-infested area indicates that the sheep louse is very widespread. Infestations were recorded from the Hughenden district through central and south-western Queensland to the New South Wales border. As a general rule, heavy infestations are seldom encountered, but active control measures in the form of dipping and spraying are being undertaken to eliminate this parasite.

Internal Parasites.

Favourable seasonal conditions have reduced losses from internal parasitism, but isolated heavy infestations resulting in a loss of condition and deaths, particularly in calves in the coastal districts, were reported. Most trouble was due to haemonchosis (stomach worms) which was controlled by treatment with phenothiazine and to a lesser extent by herd management. Infestations with hookworms (*Bunostomum phlebotomum*) and lung worm (*Dictyocaulus viviparus*) were also encountered in calves. Liver fluke infestations were recorded in cattle from the Brisbane Valley. *Haemonchus contortus* was the most commonly recorded internal parasite of sheep, but *Trichostrongylus* spp. and *Oesophagostomum columbianum* (nodule worm) were also recorded. The most serious losses from internal parasitism in sheep were recorded from the Darling Downs and coastal districts.

Poisoning.

Poisons, both plant and mineral, were again responsible for a large number of stock losses, which in some cases were sudden and spectacular.

The incidence of plant poisoning was not as great as in an average year and losses were below normal. This was due to the good pastoral conditions over a large portion of the State.

Some of the most serious losses were encountered in travelling stock. Several mortalities occurred in cattle and sheep in Central Queensland; they were considered to be due to hypocalcaemia following the ingestion of plants such as soda bush, pigweed and roly poly, all of which contain a high concentration of oxalic acid. Some spectacular recoveries followed curative treatment for this condition. Serious losses were reported from agisted sheep in the Aramac district from heartleaf poison bush (*Gastrolobium grandiflorum*).

Lantana (*Lantana camara*) was responsible for deaths in cattle in most coastal centres between Brisbane and Cairns. The most serious losses were encountered in introduced butchers' cattle awaiting slaughter. Thirty-five head were lost by one owner and 15 by another at centres between Townsville and Cairns.

Other plants which were responsible for serious economic loss during the year included bracken fern (*Pteridium aquilinum*), which caused losses chiefly amongst dairy cattle at centres between the Atherton Tableland and the southern border, Noogoora burr (*Xanthium pungens*), which was again responsible for losses in coastal and inland centres following spring rains, and green cestrum (*Cestrum parqui*), which caused deaths in dairy cattle in the Lockyer, Ipswich and Brisbane districts during the winter and spring months.

Wallum disease was again prevalent in coastal areas and was responsible for serious losses in the country immediately north of Townsville. Other plants which were associated with stock losses during the year included yellow daisy (*Wedelia asperrima*), which caused sheep losses in north-western Queensland, water bush (*Myoporium acuminatum*) and *Pimelia* spp., which were considered to be responsible for deaths of 20 dairy cattle on one farm in the South Burnett district, oleander (*Nerium oleander*), poison peach (*Trema aspera*), thornapple (*Datura stramonium*) and wild passion vine (*Passiflora* sp.).

Arsenic was the most important of the mineral poisons and was responsible for losses in most of the centres where arsenic is used for parasite control and agricultural purposes. The most common and serious cause of arsenical poisoning was incorrect mixing and usage of arsenical preparations for parasite control. The margin of error in the preparation of such mixtures is very small and a slight inaccuracy can result in serious effects on the treated stock. The source of arsenic in other cases of poisoning was associated with the use of arsenical weedicides and the careless disposal of arsenic containers.

Losses in confirmed outbreaks of arsenical poisoning varied from one head, where the source of the poisoning could not be traced, to approximately half of a dairy herd following treatment with an excessively strong arsenical mixture. Other losses from mineral poisoning included two series of deaths from phosphorus poisoning in pigs and cattle following the ingestion of vermin baits, and cases of chronic salt poisoning in pigs and sheep.

Deficiency Diseases.

The most important deficiency diseases were associated with deficiencies of phosphorus and copper. Phosphate deficiency was diagnosed from several centres in connection with sterility and other investigations, whilst copper deficiency was suspected or recorded from coastal centres between Maryborough and the southern border.

Miscellaneous Diseases of Cattle.

An unusual disease which was responsible for the death of dairy cattle on several farms in a limited area of the Kingaroy district was diagnosed as post-parturient haemoglobinuria. The disease was associated with a low phosphorus intake in recently-calved cows, and the most prominent symptoms were reddish urine, transient fever and rapid loss of condition frequently followed by death. The affected animals showed improvement following the provision of phosphorus supplements.

Salmonellosis in both calves and adult cattle was recorded from several centres. The most serious losses occurred amongst bulls whilst in rail transit.

St. George disease reappeared on the Darling Downs and in the Roma and St. George districts after a lapse of several years. The disease was widespread but the individual cases were not severe and losses were not heavy.

Blackleg in calves was reported from most centres between Rockhampton and the Darling Downs, but the disease was not prevalent and losses were light. Consequently preventive inoculation was practised only to a limited extent. Diseases of calves were reported from most dairying districts but were not prevalent. Most losses were associated with contagious pneumonia, contagious scours and calf diphtheria. Other diseases which were responsible for losses included metabolic diseases (such as hypocalcaemia and tetany), foot rot and contagious ophthalmia, which was prevalent in northern Queensland.

Diseases of Horses.

Diseases of horses, with the exception of strangles and Queensland itch, were chiefly associated with the ingestion of poison plants. Birdsville disease, due to the ingestion of *Indigofera enneaphylla*, was reported from several centres in western Queensland and the Etheridge district, where the horses were forced to feed on ridges with a high concentration of the plant during the dry weather. Walk-about disease, suspected of being caused by ingestion of *Crotalaria retusa*, was reported from several North Queensland centres extending from the Gilbert River to Ayr. Oesophageal disease due to the ingestion of *Crotalaria* spp. was reported from the Rockhampton and Etheridge districts.

Cases of Tallebudgera horse disease were reported from the Southport district. This trouble is suspected to be due to the ingestion of Crofton weed.

Diseases of Sheep.

Investigations into diseases in sheep received greater attention during the year than in the past, due to the greater prevalence of sheep diseases and the appointment of Veterinary Officers of the Veterinary Services Branch to centres in predominantly sheep country.

Diseases of most economic importance included plant poisoning, tetanus, hypocalcaemia, post-shearing and post-operative infections, humpy-back, urinary calculi, pregnancy toxaemia, entero-toxaemia, yellow bighead and infectious labial dermatitis.

Outbreaks of tetanus involving heavy losses occurred in the Central Queensland, Roma and Darling Downs districts. Hypocalcaemia was recorded following good spring rainfall over a large area of country extending from Winton to Dalby.

Melioidosis was recorded in goats in the Cloncurry and Townsville districts.

Diseases of Pigs.

Contagious diseases most frequently encountered in pigs included salmonellosis, which was reported from all pig-raising centres, Glasser's disease, posterior paralysis, infertility, rickets and vitamin A deficiency.

Diseases of Poultry.

The diseases of poultry most frequently encountered and of most economic importance included coccidiosis, leucosis, spirochaetosis, vitaminosis A and botulism.

Coccidiosis was less prevalent than usual but several severe outbreaks occurred, some being explosive in nature with heavy mortalities due to the caecal type. Black comb was encountered more often than in recent years, most losses being experienced in first-year pullets. The majority of the outbreaks were of the usual type, taking about two weeks to sweep through the flock of pullets and causing marked loss of production with little mortality. However, a more severe type causing heavy mortalities occurred in a limited number of flocks. "Crazy chick" disease and "epidemic tremor" were more prevalent than usual, whilst botulism was again frequently recorded from North Queensland.

The use of infectious laryngo-tracheitis vaccine by one owner in North Queensland gave rise to suspicion that the disease may be present in that area. The inspection of a limited number of flocks showing respiratory diseases associated with the testing of serum samples for antibodies also gave rise to the suspicion that the disease may be present in the Brisbane district. Investigations are proceeding as opportunity offers.

EXTENSION SERVICES.

A refresher school for stock inspectors in the Burnett Division held at Maryborough was a pronounced success and provided the opportunity to acquaint field officers with the latest trends in disease investigation and control and extension methods.

Demonstrations, field days and lectures to stock-owners' organizations have been carried out in all centres and most were well attended and proved very popular. The use of films to demonstrate disease prevention and control was extended.

BRANDS.

DETAILS OF REGISTRATIONS, TRANSFERS, &C., FOR 1952-53.

—	Number.	Number since Inception of Legislation.
Ordinary Three-piece Horse and Cattle Brands Registered ..	..	92,242
Cancelled Horse and Cattle Brands Registered	1,021	15,109
Horse and Cattle Symbol Brands Registered	120	2,770
Horse and Cattle Brands Transferred	1,894	80,845
Cattle Earmarks Registered ..	674	36,016
Sheep Brands and Earmarks Registered	198	14,207
Sheep Brands and Earmarks Transferred	203	9,289
Distinctive Brands Registered ..	15	1,342
Alteration of Address of Brands ..	221	..
Brands Cancelled	22	..
Earmarks Cancelled	145	..

There has been an increase in the number of registrations and transfers in respect of horse and cattle brands and cattle earmarks as compared with the previous year. The number of sheep registrations is equal to last year's, but there has been a decrease in the number of sheep transfers.

From reports received from all parts of the State, it appears that owners generally are complying with the requirements of the Acts.

The edition of the Sheep Directory complete to the end of 1951 was received in August last and copies have been distributed to Inspectors.

A revised edition of the Sheep Directory complete to the end of 1952 is at present being printed and copies should be available in the near future.

The Horse and Cattle Brands Directory complete to the end of 1952 is now ready for printing.

MEAT INSPECTION SERVICES.

The standard of meat inspection in city and country centres has been maintained. The new abattoir at Beaudesert, which commenced operations towards the end of last year and was producing meat for local consumption, has now changed over to slaughter for export. The bacon factory at Maryborough has been renovated and enlarged and is now utilized for production of all meats and poultry for local consumption and export, in addition to the usual production of cured pigmeats and smallgoods.

A new small abattoir is in the process of construction at Kilcoy to serve country centres between Caboolture and Nambour. Bacon factories in Brisbane and Toowoomba have been modernised and the latest type of machinery has been installed. The canning of hams is now a major project at certain factories. Some new slaughteryards have been erected at country centres but there has been a tendency to postpone the erection of new slaughteryards and the renovation of existing facilities serving the principal cities in the country districts pending decisions by Local Abattoir Boards on the construction of abattoirs in those areas. Information on slaughterings for local consumption are given in Table 4.

TABLE 4.

TOTAL NUMBERS OF STOCK SLAUGHTERED FOR LOCAL CONSUMPTION.

	Bullocks.	Cows.	Calves.	Sheep.	Swine.
Bacon Factories	14.207	24,204	21,952	6,383	230,621
City of Brisbane (Abattoir)	62,058	76,921	99,173	516,338	29,794
Larger Population Centres	79,300	67,807	50,042	204,264	30,035
Country Centres	32,894	31,821	33,464	56,521	11,720
Totals	188,459	200,753	204,631	783,506	302,170

The above figures exclude stock killed at the Brisbane Abattoir and other meatworks for export purposes, and stock killed for consumption on stations.

Marketing of Meat Products.

Most of the meat produced for local consumption is being marketed in the usual manner, namely slaughter at the Brisbane Abattoir or slaughtering establishments in country centres and the carcases broken up and sold through self-contained butcher shops. However, there are indications of a change in the methods of sale of meat in that there is a tendency to kill at large centralized slaughtering establishments, which then serve a number of retail shops extending from the immediate vicinity of the killing centre to distances of more than 50 miles. Other departures from normal disposal methods include the breaking up of carcases into retail cuts at central establishments for distribution to retail shops, and the provision of meat disposal centres in modern food halls and the food sections of large mixed stores. Disposal of pre-packaged deep-frozen meat from refrigerated containers and show-cases is also being considered.

BREACHES OF ACTS.

Observance of Acts administered by the Veterinary Services Branch received special attention from field officers and it was necessary for certain Inspectors, where laxity was in evidence, to recommend prosecutions. Minor and unintentional breaches were corrected by warnings, but 18 prosecutions (resulting in 17 convictions) were lodged under the Slaughtering Act and 10 successful prosecutions under the Diseases in Stock Acts were made. There were no prosecutions under the Brands Acts.

ANIMAL HEALTH STATIONS.

Dr. J. Legg, Director of Research.

This report covers the activities of the two Animal Health Stations, Yeerongpilly and Oonoonba, for the year 1952-53.

Mr. L. G. Newton, the officer in charge at Oonoonba, returned from overseas in the early part of the year under review, and Mr. A. T. Bell, who had been relieving him, returned to Yeerongpilly. Mr. F. A. Lewis, bacteriologist at Oonoonba, resigned and his position has not yet been filled through lack of a suitable applicant.

LABORATORY, BUILDINGS, Etc.

Steps have been taken to improve the laboratory accommodation at Yeerongpilly. A large room is now being fitted for the preparation of specimens for histological examination. When this has been accomplished, rearrangement of other rooms will give much more floor and bench space to the bacteriological section of our activities. Further alterations will soon be made in the accommodation for autopsies, and this will remove some of the present congestion.

A new crush and yards for handling paddocked cattle is in course of construction. This should be of very great value. During recent years, because of the influx of cattle it has been impossible to provide stable accommodation for many animals and first-class outside facilities are necessary to reduce the time occupied in attending to paddock stock. A new set of cattle pens is also in course of construction.

At Oonoonba the Works Department has been doing some badly needed repairs to some of the buildings.

An area of nearly 400 acres has been acquired at Rocklea for developmental purposes. Good use has been made of part of the cultivable area for the production of fodder crops for feeding cattle, &c., at Yeerongpilly.

The numbers of specimens examined and vaccines distributed by the two stations are shown in Tables 1 and 2.

TABLE 1.

SUMMARY OF SPECIMENS EXAMINED.

——	Yeerongpilly.	Oonoonba.	Total.
Number of batches of specimens	3,288	587	3,875
Complement fixation tests for contagious bovine pleuro-pneumonia ..	2,415	..	2,415
Brucellosis agglutination tests—			
Bovine	6,343	374	6,717
Porcine	2,445	43	2,488
Milk samples, bovine mastitis	1,047	61	1,108
Milk samples, caprine	..	21	21
Autopsies—			
Fowls	1,124	134	1,258
Ducks	30	7	37
Pigs	50	20	70
Sheep	65	11	76
Cattle	33	2	35
Horses	2	2	4
Goats	..	21	21
Dogs and cats ..	5	6	11
Other animals ..	21	..	21

TABLE 2.

VACCINES SUPPLIED.

——	Yeerongpilly.	Oonoonba.	Total.
Contagious pleuro-pneumonia (doses)	155,125	219,925	375,050
Infectious labial dermatitis (doses) ..	214,000	..	214,000
Brucella abortus Strain 19 (number of calves inoculated) ..	24,760	..	24,760
Tick fever blood (doses)	23,460	6,188	29,648

Some of the activities of the Station are illustrated in Plates 1-5 (page 27).

DISEASES AND PARASITES OF CATTLE.

Tick Fever.

Bleeders for the immunising of cattle have been continually in demand; 234 were prepared and sold at Yeerongpilly and 10 were dispatched from Oonoonba.

Table 3 shows the number of bleeders sold and cattle immunised at Yeerongpilly over the last nine years.

TABLE 3.

TICK FEVER IMMUNISATION (YEERONGPILLY).

Year.	Bleeders Sold.	Stud Cattle Immunised.
1944–45	53	216
1945–46	73	190
1946–47	76	170
1947–48	134	187
1948–49	110	312
1949–50	156	467
1950–51	214	569
1951–52	111	364
1952–53	234	423

Generally the work has proceeded in a satisfactory fashion, though the following points are worthy of note. It has been observed that it is not always easy to control the reaction due to *Babesia argentina* with any of the recognised specifics, and quite frequently the therapeutic dose has had to be repeated on more than one occasion. There have been instances in which there seems little doubt animals would have succumbed if treatment had been confined to the one dose. Observation shows that there is usually an immediate response to treatment, but as the effects of the drug wear off the temperature shows a tendency to rise again accompanied by an upsurge of parasites in the peripheral circulation. It is difficult to account for this, for the strain throughout the years has never been subjected to any drug, and has therefore not had an opportunity to become drug-fast.

Tick Control.

Work with both spraying and dipping fluids has been continued and some of the herds have completed five years of treatment. With one dairy herd sprayed with toxaphene, very good control has been obtained with no evidence of resistance on the part of the tick over this period. A second herd, the property of the same owner and located in the same district, has been treated over a similar period with chlordane with equally effective results. These two herds have provided a great deal of information on the use of these two preparations in tick control in dairying districts.

In another herd, located at some distance and also treated by spraying with chlordane, there was some evidence suggesting that the ticks are becoming resistant. A change was made to toxaphene for the time being, but the owner has not been very co-operative and it seems likely that work will have to be discontinued on this property. This is rather unfortunate, because one of the objects of continuing this work in dairy herds year after year is to determine if the parasites on any farm after prolonged use of any one of these preparations are capable of developing a resistance.

One herd has been under treatment by spraying with dieldrin for three years with quite satisfactory results. There has been no evidence of resistance to the drug.

These few spraying trials that we have been able to continue for so long in South Queensland have revealed that requirements can be met by spraying during the summer months only, and that dairy herds can be left without treatment over the winter months. Just when treatment should be first applied, with the onset of warmer weather, in any one year, depends entirely upon the seasonal conditions prevailing. If there are good spring and early summer rains there is an immediate build-up of the tick population, and control must be taken in hand often as early as October. If the spring and early summer are dry, treatment need not be commenced until much later.

With dipping trials in South Queensland only one BHC vat is in operation. This is in the Brisbane district, and has been under our control for over five years. The BHC content is only half that recommended by the manufacturers, yet in the dairy herd used in the work, tick control has been quite satisfactory. Here again, as with spraying, it has not been found necessary to treat cattle during the winter months.

There are at present three dipping vats charged with toxaphene, one in Central Queensland and two in South Queensland. In the case of one vat in South Queensland, the owner has disposed of his dairy herd, which at the commencement of operations was very heavily infested and where control with arsenic was difficult, and now uses the property for small mobs of cattle of beef breeds which he buys and sells as opportunity offers. There is therefore no permanent group of bovines on the property on which continuous observations can be made. This is unsatisfactory, but the alteration which an owner may make in his business is something over which we have no control.

In the case of the other two toxaphene vats, good co-operation is being obtained from the owners, both of whom are beef cattle producers. It is hoped that some satisfactory results can be obtained. In Central Queensland it is expected that the higher winter temperatures will result in the need for some treatment for ticks during the middle of the year, though how much in the average year has yet to be determined.

Some work was completed with ticks from New South Wales reputed to be resistant to arsenic. The parasites were taken through three generations and altogether 15 bovines were artificially infested. All the recognised insecticides were used, and it was found that although the parasites throughout were strongly resistant to destruction by arsenic, they were susceptible to all the synthetic hydrocarbons employed.

In the last report we referred to the absence of any evidence suggesting that the cattle tick might have developed a resistance to any of the synthetic insecticides used by us in experimental work or in the field. We have referred above to the evidence regarding recent observations on chlordane resistance in one dairy herd. More recently, however, some reports from North Queensland suggested that there may be a resistance to BHC. Laboratory tests supported this and indicated a resistance to several other synthetic insecticides as well. This was an important finding and suggests that resistance to one chlorinated hydrocarbon implies resistance to some of the others as well. Our observations have, however, been limited.

In our last report we also referred to the use of a biological assay in determining the lethal qualities of dipping fluids. We have found these tests very useful and it is considered that they give a much better evaluation of the lethal qualities of a dipping fluid than chemical analysis, more particularly as it has been reported overseas that loss of biological efficiency (LOBE) can occur without any change in the concentration of the insecticide in the fluid employed. The biological assay is time consuming and expensive, but it does give very valuable results, so much so, that we are now applying it every six months to all dipping vats where observations are being made on tick control.

Results of this biological test applied to one dipping vat over the years at one of the most important cleansing points for stock moving interstate are of interest. This vat was charged on December 1, 1947, with a proprietary paste preparation containing 50% para para DDT and which required heating before addition to water. The vat held 3,400 gallons, and the charging rate was approximately 0.65% DDT. It was cleaned out for repairs five years later (December 6, 1952). Over this period more than 200,000 gallons of water had been added as well as nearly five hundred 56 lb. drums of the DDT paste. More than 170,000 cattle had been dipped, as well as some 2,000 horses. Although the physical condition of the fluid had been reduced to a point where it was little better than liquid mud long before being cleaned out, the biological tests applied every six months showed that the lethal quality always remained high, and was at no time lower than what might be expected from freshly prepared fluid of the same DDT strength (i.e., approx. 0.6%).

There is evidence in Queensland of resistance to BHC and some other synthetic insecticides.

Mastitis of Dairy Cows.

The widespread use of penicillin has effected an enormous reduction in the losses suffered from the common form of mastitis, viz. *Streptococcus agalactiae* infection. However, the increasing importance of penicillin-resistant forms of mastitis is evidenced by the large number (1,107) of milk samples submitted for bacteriological examination. Most of these samples were from herds where there was a high incidence of streptococcal mastitis or where penicillin-resistant infections, such as staphylococcal mastitis, were prevalent. In either instance control of the disease is effected by improved sanitation and milking technique, two practices that have been to some extent neglected as a result of the success of penicillin treatment.

Contagious Pleuro-pneumonia.

The complement fixation test was done on 2,415 blood serum samples. The majority of these (1,900) were from cattle intended for export to other States, New Guinea or overseas. Most of the remainder (302) were tests for the detection of carriers in outbreaks under quarantine in dairying districts, while 213 tests were done for diagnosis in animals showing symptoms suspicious of pleuro-pneumonia.

Leptospirosis.

Laboratory tests for the diagnosis of leptospirosis in cattle and pigs were again used extensively by field officers. During the year, 248 urine samples and 761 blood agglutination tests were done.

Investigations were directed chiefly to the disease in dairy cows. In the Gympie district there were serious losses during the wet months of the 1952-53 summer from leptospirosis, but in 10 other herds that were investigated equally serious losses were caused by a disease indistinguishable in the field from leptospirosis, and yet not confirmed as such in the laboratory. In both diseases there was mild fever followed by anaemia and jaundice, but the outstanding feature was a sharp drop in milk production, and often the cows dried off even though they may have calved only a few weeks. Investigation had failed to reveal the cause of this second condition at the time the outbreak subsided. The loss was estimated in one herd at £1,200 based on £30 per lactation for the 40 cows that dried off.

Infertility of Cattle.

The success of Strain 19 vaccine in preventing the commonest and most destructive cause of infertility, viz. brucellosis, has focussed attention on the many other causes of infertility in cattle. It must be mentioned, however, that many farmers still suffer serious losses from brucellosis as a result of not adopting vaccination in their herds.

Vibriosis.—This bacterial infection causes abortion and/or infertility. It was diagnosed during the year in seven herds, but it is undoubtedly more widespread than this would indicate, because diagnosis of the disease is not easy. The best material for bacteriological examination is an aborted calf, but these are seldom recovered in a fresh state under Queensland conditions.

It is believed that in most affected herds the bull is infected. Bulls in such herds have therefore been examined in collaboration with the Veterinary Services Branch with a view to improving the methods used for diagnosis. Samples are taken from the sheath of the bull and hence are invariably contaminated, so detection of the vibrio is difficult. However, the method has been successful so far in three herds and shows promise. It is being used to study the course of the infection in a bull used in an infected herd near Brisbane.

Serological and other bacteriological procedures for diagnosing vibriosis in cows are now used in some laboratories overseas, but we have been unable as yet to devote sufficient time to these to develop them for use in our laboratory.

Trichomoniasis.—This infectious disease also causes abortions and infertility. The abortions usually occur early in pregnancy and hence are often not detected. When trichomoniasis is brought into a herd the effect on the breeding programme may be disastrous, at least for the first year or two. The disease is transmitted solely by the bull.

The disease was found in 1952 in specimens from a herd in the Moreton Division. This led to a wide survey of herds that might have had contact with the infected herd through proximity or exchange of bulls, or as a result of bulls breaking fences. The procedure for detecting the causal organism has been improved by developing a culture medium in which small numbers of trichomonads will grow in spite of the presence of contaminating bacteria.

The specimens examined in the laboratory are summarised as follows:—

Number of herds	23
Number of specimens	188

Results—5 positive samples from four herds; remainder negative.

Diseases of Wallum Country.

These are conditions which are found at various places along the coast from north of Townsville to as far south as Caboolture.

Experimental feeding with different species of *Macrozamia* has been continued at Yeerongpilly. The nervous disorder produced by *Macrozamia* species has been found to be quite distinct from the condition referred to by farmers as "wamps."

Several species of grass-tree (*Xanthorrhoea*) are under suspicion as causes of "wamps." A limited feeding test at Oonoonba with *Xanthorrhoea quadrangulatus* gave negative results (see under Plant Feeding Experiments). Work with these grass-tree species is proceeding.

Copper Deficiency.

In an experiment on the Near North Coast being done in collaboration with several other Branches, groups of Hereford heifers have been grazed on copper-deficient pastures topdressed in various ways. Liver samples have been obtained regularly from the living animals by the biopsy procedure to determine the amounts of copper stored in their bodies. All groups made good liveweight gains, even on the untreated pastures, although the liver copper levels were rather low at the end of the experiment. The incidence of copper deficiency in cattle is greatly influenced by seasonal conditions, so the experiment is being continued for at least another year.

Studies have been continued in collaboration with the Chemical Laboratory on possible methods for providing in one dose sufficient copper to meet the needs of sheep or cattle for several months. Among the many copper compounds examined, one shows promise of being safe and effective, and arrangements are in hand for a field trial to assess the safety of the procedure, and particularly to determine how much copper must be injected to enable sheep running on deficient country to produce normal wool.

SHEEP AND GOATS.

Epididymitis in Rams.

In a previous report the isolation of a Brucella-like organism and its ability to produce epididymitis in rams was recorded. This work has been confirmed. As well as from abattoir specimens and natural cases autopsied at the laboratory, the organism has been isolated from specimens submitted from the field. It also occurs in the semen of infected rams.

An experiment was done to test the infectivity of this organism by the preputial route for rams. Eight animals were exposed twice. Four were kept on a low plane of nutrition and four on a high plane for 12 months. All animals were normal at autopsy. Further work is being done with modifications of exposure by this route.

Although 25 strains of the organism have been studied, none have been suitable for a serological test to detect carriers of the disease.

"Humpy-Back" of Sheep.

Seasonal conditions since 1949 were not conducive to widespread occurrence of this complaint until early in 1953, when outbreaks were common in most districts from Goondiwindi north to as far as Julia Creek. The opportunity was therefore taken to continue the investigations commenced in 1949.

The symptoms become manifest when full-woolled sheep are mustered during January to April. Affected sheep soon lag behind the mob, develop a "humped" back and soon become unable to travel, although they remain quite alert. Persistent driving may cause death, but otherwise the losses are few. There is, however, inconvenience and added expense in mustering through having to cart affected sheep to the shearing shed.

The limited seasonal incidence and the nature of the disease suggested that it was a plant poisoning. It was therefore decided this year to make further botanical surveys of three affected paddocks in the Cunnamulla, Longreach and Aramac districts. This was done by a botanist and a veterinary officer. Analysis of the results of the surveys made in 1949 and this year showed that three plants were common and freely eaten by sheep on each of the affected pastures.

Two of these plants have been tested by feeding to sheep at Yeerongpilly. What appears to be a condition strongly simulating the syndrome seen in the field has been produced in one animal. No further plant material is now available, as both plants grow in the summer only, but the work will be continued as early as possible during the next summer.

Body Strike in Sheep.

During the year two trials were run in association with the Veterinary Parasitology Laboratory, C.S.I.R.O., Yeerongpilly, to compare methods of application and the efficiency of DDT, BHC, aldrin and dieldrin in protecting sheep from body strike. Though fleece rot was developed in many sheep by frequent wetting and the local blowfly population was increased by the release of large numbers of laboratory bred *Lucilia cuprina*, no natural cases of body strike occurred. The efficiency of the insecticides was compared using bioassay and larval implantation techniques. These methods showed that jetting a strip 12-15 inches wide from the shoulder to the butt of the tail with 0.3% aldrin or 0.4% dieldrin rendered the fleece toxic to first stage *L. cuprina* larvae for 18-20 weeks. DDT at 0.5-1.0% and BHC at 0.1% gamma isomer allowed development of larvae after 12-14 weeks. These results must be treated with caution, for the frequent wetting in attempting to induce natural oviposition produced abnormal fleeces.

Georgina River Disease.

Work was continued on this disease in the Dajarra district, where we have concentrated our activities for some years. An experimental mob of sheep was placed in the enclosure prepared some two years earlier and from which all the gidyea (Georgina variety) had been ringbarked during the previous winter. The object of the experiment was to ascertain whether the disease would appear at the usual time, i.e., in August-September when the gidyea was producing pods in large numbers in the paddocks outside. Unfortunately the experiment proved abortive, because the plant failed to produce pods anywhere in the district although in heavy flower in the early spring. This was unexpected, because the season had been a particularly good one and it was thought that the plant would produce fruit at the usual time. However, if the causal agent of the disease is found to be the gidyea seed, which is consumed by both cattle and sheep when available, its absence in certain years may explain the varying incidence of the outbreaks both in time and locality.

Further work is planned for the spring and summer period of 1953.

Melioidosis.

This disease has been confirmed in five herds of goats in the Townsville district and one from the Cloncurry district. The disease is well established in goat herds in the Townsville area. Three hundred and eighty-five goats have been tested with melioidin. From those autopsied the organism was cultured from 27 and a further 11 had old sterile lesions showing the characteristic histological changes.

Three cases have shown mastitis, two of them acute, and the organism has been readily cultured from milk in the affected quarters. In one animal which showed chronic mastitis the organism was recovered in 17 of 18 milk samples taken over a period of two months.

DISEASES IN PIGS.

Swine Brucellosis.

The agglutination test was applied to 2,445 blood samples, most of which were from the 80 herds listed under the Department's brucellosis-tested-herd scheme. The disease was found in seven herds.

Tubercle-like Lesions in Lymph Nodes.

Study of the lesions resembling tuberculosis that occur in the submaxillary lymph nodes of pigs has been completed. It was concluded that these lesions are caused by infection with a bacterium, *Corynebacterium equi*; also that they can be satisfactorily distinguished from tuberculosis during routine meat inspection, thus conserving many heads that would otherwise be condemned as tuberculous.

Other Swine Diseases.

Pig raisers and field officers of the Department again made considerable use of the laboratories for diagnosis of the cause of losses, unthriftiness and breeding troubles. In addition to many specimens of swine organs and feeds, 70 pigs were submitted for post-mortem examination. The infectious diseases found most often were salmonellosis, Glasser's disease and infectious pneumonia. One outbreak of swine erysipelas was recorded. Various forms of malnutrition were also common. At the close of the year experimental work on the causes of birth of dead or weak litters was commenced.

DISEASES OF HORSES.

Tallebudgera Horse Disease.

This unusual disease occurs in the south-eastern corner of Queensland and the adjacent districts of New South Wales and is confined to the area common to the plant *Eupatorium adenophorum* (Crofton weed). This plant is readily consumed by horses and was thought by stock-owners in the area to be the cause of the complaint. Feeding of this plant to horses, however, has not been followed by the appearance of symptoms, at least not up to the present, although some of the horses used have eaten 2-3 tons of the weed.

Oesophageal and Stomach Ulceration.

Attention was drawn in the last report to the appearanec of this condition in the Rockhampton district. In North Queensland it is known to be due to the eating of the plant *Crotalaria aridicola*. In Central Queensland this species was not present in the area grazed by the affected horses, but a closely allied species, *C. trifoliastrum*, was present in quantity and was evidently being consumed by the horses. The field evidence was therefore very convincing. A feeding test with *C. trifoliastrum* failed to produce the disease. The plant used, however, had been collected some time and had dried out and was probably not very suitable for testing purposes.

DISEASES OF POULTRY.

General.

The diseases found in 403 batches of specimens (1,124 fowls) examined at Yeerongpilly during the year are shown in Figure 1. This shows the disease problems that cause poultry raisers to seek laboratory examinations and advice, and is probably a reasonable representation of the relative incidence of diseases in the industry.

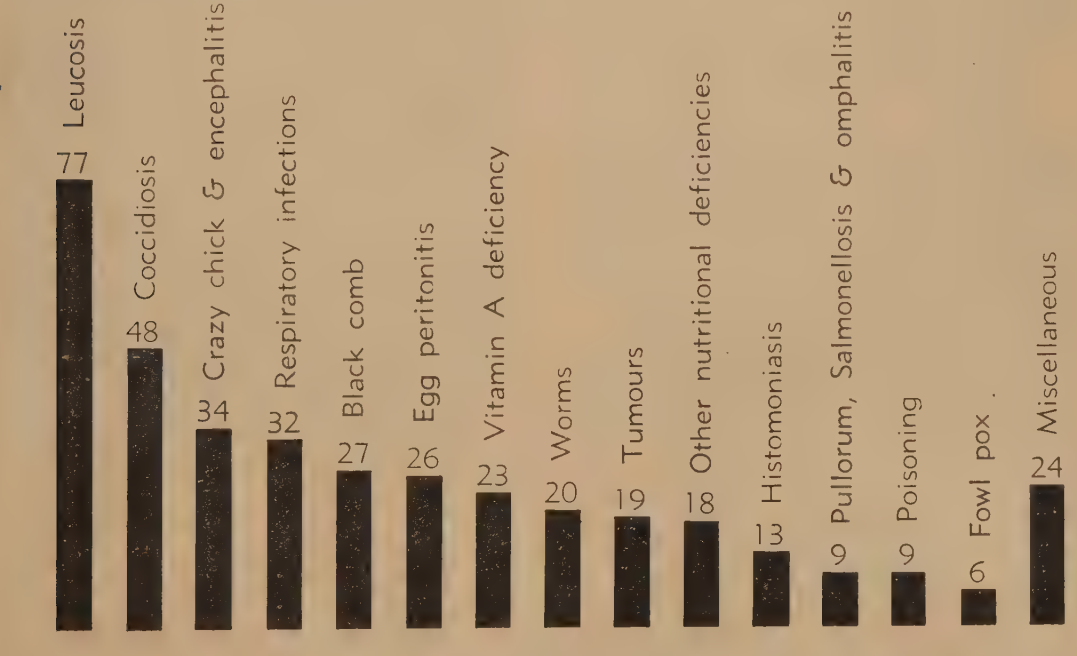


Fig 1.

Diseases Diagnosed in 403 Batches of Specimens (1,124 Fowls) Examined at Yeerongpilly in 1952-53.

Survey on Vitamin A Deficiency.

As deficiency of vitamin A is one of the common feeding troubles in commercial flocks, a survey was done by submitting to the Chemical Laboratory livers of birds selected from among those normally received at Yeerongpilly for diagnosis and advice. Analyses have been done on livers of 172 fowls (86 flocks) and 17 ducks (13 flocks).

It was found that in adult fowls there is close agreement between chemical results and post-mortem findings, so, provided several representative birds are available, the post-mortem examination will usually reveal the trouble. In young chickens, however, the analyses revealed many cases of poor growth, poor viability and "leg weakness," which were due to vitamin A deficiency but which would not have been detected by post-mortem examination alone.

The study is being continued to determine the importance of borderline deficiency as a predisposing factor in other poultry diseases.

Respiratory Infections of Poultry.

The group of diseases under this heading, usually called "roup," present one of the most troublesome problems in growing stock. Several different bacteria and viruses are concerned and the symptoms and lesions they produce are often very similar, so exact diagnosis

is not easy. This year a study was made of the viruses associated with these respiratory diseases by inoculating material from naturally affected birds into chick embryos. Viruses recovered in this way from two flocks are now being studied in experimental chickens and some tests were done in collaboration with the Queensland Institute for Medical Research to identify them.

POISONING OF LIVESTOCK.

Chemical.

Losses due to poisoning by chemical substances were identified as follows:—

Arsenic—in 35 separate herds of cattle, one herd of goats, and four flocks of fowls.

Lead—in cattle on nine occasions and once in dogs.

Salt—once each in fowls, ducks, and pigs.

Phosphorus—in one herd of cattle, once in pigs, and once in fowls.

Strychnine—twice in dogs.

Thallium—caused the death of three pigs, which had access to treated wheat used for baiting rats in canefields. The pigs showed vomiting, incoordination, prostration and death.

Sulphamezathine—once in chickens receiving therapeutic doses daily for 12 days.

BHC—poisoning was suspected in a flock of fowls at Silkwood. Some died quickly but usually they developed an ataxia progressing over several days until the birds became prostrate and unable to obtain food and water.

Plant Poisoning.

The number of deaths from plant poisoning is smaller than in 1951-52, when drought conditions prevailed for a long period.

The following plants were suspected of causing deaths in cattle:—

Cestrum parqui (green cestrum)—at Deuchar.

Portulaca oleracea (pigweed)—travelling cattle at Kynuna.

Pteris aquilidium (bracken fern)—at Carina, Lower Cressbrook, Esk, and Currumbin Creek.

Castanospermum australe (Moreton Bay chestnut)—unripe seeds were suspected in a mortality at Mount Crosby.

Lantana—at Strathpine and Gympie.

In addition to the above records the following plants were suspected of causing deaths in other animals:—

Portulaca oleracea (pigweed)—travelling sheep at Winton and Longreach.

Cheilanthes tenuifolia (mulga fern)—in sheep at Ducklo and Wallumbilla.

Eremophila maculata (native fuchsia)—sheep at Charleville.

Melia dubia (white cedar)—berries of this tree caused deaths in pigs at Benair and Crows Nest.

Xanthium pungens (Noogoora burr)—deaths in fowls in Brisbane.

Cestrum parqui (green cestrum)—deaths in fowls in Brisbane.

Ipomoea sp.—grain sorghum heavily contaminated with seeds of a species of *Ipomoea* (12.7% by weight of the sample) was suspected of causing diarrhoea in pigs when it was fed crushed but not when fed whole.

Plant Feeding Experiments.

(1) *Acacia cambagei* (gidyea). Two sheep each ate 68 lb. of leaves during 71 days and showed no ill effects.

(2) *Pimelia linifolia.* A steer ate 15 lb. of whole mature plant during 11 days and showed no ill effects.

(3) *Myoporum diffusum.* A steer ate 8 lb. during four days and showed only slight depression, from which it quickly recovered.

(4) *Crotalaria trifoliastrum.* 131 lb. of dried plant from Rockhampton has been fed to a horse during 47 days without ill effects.

(5) *Crotalaria retusa.* Mortalities due to "walkabout" disease have been known in the Ravenswood area for many years, and the plant suspected in Western Australia (*C. retusa*) is found there. At Oonoonba a horse was fed 52 lb. of the mature seeding plant over 34 days without producing signs of the disease.

(6) *Xanthorrhoea quadrangulatus.* A steer 11 months old and weighing about 300 lb. was fed 623½ lb. over a period of 120 days. It received only the white resin-coated portions from the crown of the plant and was given only small quantities of other food in an endeavour to simulate natural conditions. The animal developed a staring coat and lost condition but showed none of the recognised signs of "wallum" disease.

(7) *Cycas media.* In direct contrast to the previous year's findings, feeding tests in December 1952 showed the plant to be highly toxic. A bovine received 26 lb. of fresh green leaves over 17 days, and at the end of this period showed slight inco-ordination but was not noticeably ill. Later it showed acute ataxia and pushed blindly into fences. Death occurred soon afterwards and at autopsy an acute oedematous haemorrhagic condition, not unlike that in bracken fern poisoning, was seen. The calf of this animal, which could have taken only a few pounds of plant, was kept under observation for four weeks, when it too died. At autopsy similar changes but less marked than in the cow were seen.

(8) *Datura stramonium.* Grains contaminated with seeds of thornapple are from time to time suspected of poisoning pigs, but there is no proof that this is so. A poor-quality grain sorghum heavily contaminated with *Datura* seeds (0.85% of the sample) was tested by feeding to two weaner pigs. During 42 days the pigs ate 70 lb. and 67 lb. of the contaminated sorghum and increased their liveweights from an initial 36 lb. to 70 lb. and 75 lb. respectively. They showed no ill effects.

SHEEP AND WOOL BRANCH.

Mr. G. R. Moule, Director of Sheep Husbandry.

Sheep numbers increased by 866,000 to 17,029,623 during the year. However, the State's flock is still below the mean of 18.5 million. Some severe losses occurred in the north-west as the result of the drought, but elsewhere successful lambings were recorded. The percentages of lambs marked to ewes mated were higher than those previously recorded on many properties in the central-west. This is a favourable trend, as flocks in this area had been depleted and some were comprised mainly of sheep in the oldest age groups.

The wool market remained firm during the year. Prices generally showed an upward trend until the June sale, when a slight decline occurred for all types of wool. In all, 530,052 bales of wool were sold for a return of £61,855,194.

EXTENSION WORK.

Sheep and wool extension officers are located at the Toorak Field Station (Julia Creek), Hughenden, Winton, Longreach, Barcaldine, Emerald, Blackall, Charleville, Cunnamulla, Roma, St. George, Warwick, Dalby, and Brisbane. A full staff was maintained at all centres, except Emerald, during the year. The Senior Adviser located at Emerald has been on sick leave since August 1952.

Field officers followed the pattern of extension work already established for this Branch. They contacted 3,597 woolgrowers and conducted 936 demonstrations on properties; eight field days were conducted. A dissection of this work is shown diagramatically in Figures 1 and 2.

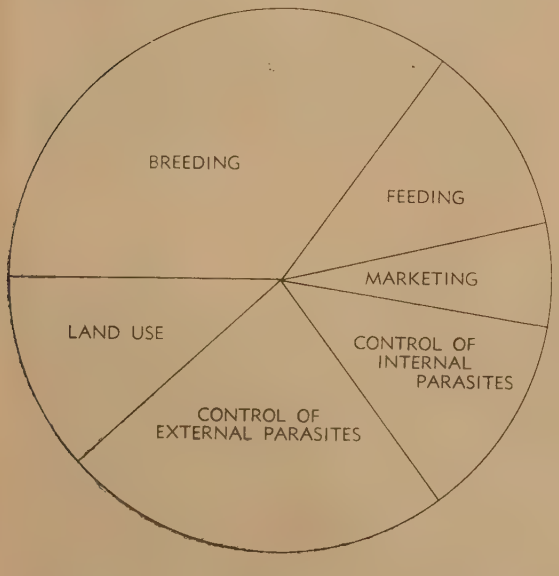


Fig 1.

Dissection of Subjects on which Advice was Given to Wool-growers in 1952-53.

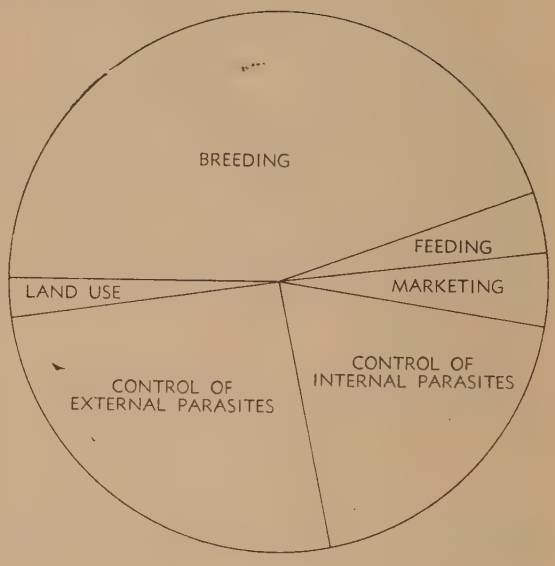


Fig 2.

Dissection of Subjects of Demonstrations in 1952-53.

Making Extension More Effective.

A study was made of the co-operative agricultural extension services in the United States of America during the first four months of the calendar year. The United States can boast the oldest and most highly organised extension service of any country in the world. Basic reasons for this are—

(1) Extension services constitute a profession within the broad requirements of adult education.

(2) American administration wishes to be certain that rural people are at no disadvantage when compared with urban people.

(3) Agriculture is a large industry in America. There are about 28 million people on nearly 6 million farms comprising nearly 1,200 million acres. They produce about 3 billion bushels of corn, 1 billion bushels of wheat, 10 million bales of cotton and 5.5 billion dozen eggs a year. They tend about 80 million head of cattle, one-third of which are milk cows, 60 million pigs, 30 million sheep and 481 million fowls.

(4) Population pressure demands large agricultural production to feed and clothe the people.

(5) Extensive mechanisation has increased capitalisation. As a result the American farmer cannot withstand more than about two years of adverse seasons and/or prices.

(6) Distribution costs are high. Only half of every dollar earned by agriculture finds its way back into the farmer's pocket. About half of this is taken by production costs.

(7) Although the rural people constitute only 19% of America's population, the economy of the country is largely dependent upon agriculture. There has always been a 7 : 1 ratio between the national income and farm income. By keeping farm incomes buoyant the national income has been kept up.

The extension service is financed by approximately equal contributions from the Federal Government, the State Government and the agricultural industries through their county organisations. The rural people participate fully in forming policy and in planning and executing the various extension programmes. They feel they have a stake in extension's philosophy and its actions. They are a part of extension's service, as distinct from people who expect extension to render them service without their contribution to its activities.

There are about 28,000,000 people on America's 6 million farms. The extension services employ approximately 12,000 officers, about one-third of whom are women extension officers. The Federal Government contributed approximately 33 million dollars to the total cost of the co-operative extension service in 1950-51. Some States appropriate as much as 0.2% of the total annual value of their agricultural production for extension work. If extension in Australia was organised in a similar way, something like £120,000 would have been available from State sources for sheep and wool extension during the year. In addition, a comparable amount would have come from both the Federal Government and the industry, although the latter's contribution would have consisted largely of services, such as office accommodation, typing and telephone services, etc.

About one-eighteenth of this total amount was available from consolidated revenue for the maintenance of field staff of the Sheep and Wool Branch during the year. Approximately one-tenth was available for the conduct of the whole of the Branch. However, a ratio of 1 field officer to every 400 properties was maintained; in the United States there is approximately 1 extension worker to every 500 properties. After making due allowance for higher costs in the United States, the differences in expenditure reflect something of the differences in approach. More "wholesale" methods are used in American extension work, which has much wider educational ramifications.

Agricultural extension is probably one of the most difficult problems facing the Australian nation. However, its importance has increased considerably during the last two decades. Australia's rapidly growing population continues to make further demands upon the food available within this country. The cost of producing primary products has continued to rise, although the wool industry has been fortunate, as world prices have been maintained at high levels. However, in some respects this has accentuated the difficulties of carrying out effective extension work to the sheep industry.

Wool-growing is a way of life before it is a means of earning a living or of providing apparel for people in other countries. Therefore, to be really effective extension work must consider the fundamental needs of the rural communities with which it works. It must take cognizance of their social structure, and find ways of developing their ability to solve their own problems. This calls for a clear definition of extension's aims and for the creation of facilities for industry's participation in extension's programmes.

Education is usually accepted as being the first aim of agricultural extension. This demands that extension workers should be clear in their own minds as to the purposes of education and to the type of education required by rural people. It is necessary they appreciate that adult education is more difficult than the formal classroom education. The extension worker must attain his aims of teaching people how to think, as distinct from what to think, through the channels of communication provided by everything ranging from social intercourse between individuals to the mass media of radio and the press.

The educational aims of any extension organisation will be determined partly by the philosophical concept of its administrators of extension's position in a democratic society. They will also be determined by the place people of our rural communities should occupy within the national scene. It is no exaggeration to say the welfare of the world is largely dependent upon the farmer. But history has shown often enough that food and clothing are not the only important contributions the farmer makes to the character and culture of nations.

The human qualities usually deep-rooted in rural people are often quoted as being valuable attributes of the Australian character. Their preservation and further development are a definite responsibility of any organisation working within the broad field of adult education amongst rural people. Perception, analytical thought, broad vision, a reasoned approach, an inclination towards carefully controlled experimentation and care in drawing conclusions are not always apparent in the thinking and expressions of rural people. Their development within rural communities is essential to the future welfare of farmers, who obviously will have to adapt themselves and their practices to at least some of the rapid changes which probably will occur in the pattern of Australia's agriculture during the next few decades. The development of these qualities is an educational problem. They are important responsibilities of any extension service to the rural people with which it works.

Production programmes and projects are but a part of the tools with which extension can work. Essential though they may be to the immediate welfare and continued existence of Australia, their educational value to the rural communities at which they are directed should always be remembered.

The Sheep and Wool Branch has established itself as an extension medium in this State. This is largely due to the service it has given. While the employment of officers anxious to give service is the first requirement of any extension team, the service given by the extension worker reflects partly the service given to him.

There is not much point in recommending the use of phenothiazine, or any other treatment, if the farmer does not know where to get the required material. Similarly, there is no point in suggesting changed methods of sheep breeding if the facilities which make appropriate changes practicable are not available. Nor can the extension team carry new information to the industry if there is not a steady flow of ideas with practical application coming forward.

Because of the sparseness of the populaton in the sheep pastoral country there are insufficient towns in which advisory staff could be located to permit personal contact with the whole industry. In addition, giving personal service is not likely to help the industry as much as fostering a desire to help itself.

One of the main problems of extension work is the lack of channels of communication between the extension staff and the sheep industry.

Surveys in the United States of America, which has highly developed and well organised extension services, have shown that the majority of farmers obtain their information about farming practices from one another and from the agricultural press. It is probable that the same channels can be used in Queensland..

Prerequisites of this development are the closest liaison with the industry in order to foster leadership amongst rural people and the devoting of more time to influencing their attitude so that they are in a better position to decide upon appropriate lines of action.

This could be achieved by:—

(i.) Ensuring that rural people take part in framing extension policy and programmes.

(ii.) The greater use of the agricultural press for the dissemination of extension information.

(iii.) The better presentation of extension information.

Wool Biology Laboratory.

The most noticeable trend in extension work during the year has been the interest which has developed in the work the fleece-testing laboratory can do. The laboratory was established in 1950 and commenced to function in 1951. It became apparent during the school which was held conjointly by C.S.I.R.O. and the Queensland Department of Agriculture and Stock in September, 1951, that future developments in sheep breeding would call for the keeping of careful records and the use of precise measurements to assess fleece quality and the productivity of individual animals.

Work done by C.S.I.R.O. has shown that measurements performed on a sample from the mid-side region of a sheep are very close to the average of those made on a large number of samples over the whole of the sheep's fleece. This means that by using a mid-side sample an average picture of the sheep's fleece characters can be obtained.

Greasy fleece weights are obtained on the property at the time of shearing, and are forwarded with the mid-side samples to the Wool Biology Laboratory, where the clean scoured yields are determined and clean fleece weights calculated. Other work performed on the wool samples includes the measurement of staple length, fibre thickness and fibre uniformity. In this way, differences not detectable by the human eye are revealed by the microscope.

Fleece testing also incorporates the examination of the structure of the sheep's skin. By examining prepared sections of skin under the microscope two types of fibres can be distinguished and their numbers counted. It is becoming evident that changes in the ratio of these types of fibres can have quite a marked effect on the evenness and appearance of the fleece.

The results of fleece testing are returned to the owner through the Sheep and Wool Adviser in that area. They are expressed in two forms: firstly, as obtained from the samples; secondly, in a manner that shows by how much each sheep differs from the average of the group. In this way, the grazier has permanent recorded data on which to base his selection.

It was anticipated that considerable difficulty would be experienced in carrying out successful extension work to the stud sheep industry on more recent trends in animal breeding. It is now obvious that many stud-masters are anxious to avail themselves of the facilities the wool laboratory has placed at their disposal. This is both encouraging and surprising. It is surprising because the Australian breeder of Merino sheep has a well deserved world-wide reputation and no one has actually demonstrated to the industry the advantages to be obtained from applying modern techniques to sheep breeding. However, 11 of the State's 72 stud masters and a number of flock masters have, during this year, used the facilities the wool laboratory provides.

IMPROVING QUEENSLAND'S FLOCKS.

Since the establishment of the wool laboratory, the Sheep and Wool Branch has been in a strong position to undertake work on the improvement of Queensland's flocks.

The rate of improvement of the average productivity of the sheep in the 4,600 different flocks in this State is dependent upon the rate of improvement in the studs which supply them with rams. For this reason, it is worth reviewing briefly the work which can be undertaken by the wool laboratory with special reference to the Queensland Merino stud sheep industry.

The Merino Stud Sheep Industry.

The average cut per head of sheep in Queensland has shown a steady increase during the last 50 years. This is in keeping with general trends in the Australian flock, although it is more interesting. There have been marked changes in the composition of flocks in other States, but in Queensland Merinos predominate almost to the exclusion of all other breeds. The increased proportion of crossbred ewes, which have paved the way for the development of the fat lamb industry in other States, may have contributed to their greater average cuts per head. But in Queensland the increase from 6·1 lb. per head for the 5-year period 1895-1900 to 8.25 lb. per head for the period 1945-1950 has been brought about entirely in a Merino population. The important question to consider is the contribution the studs have made to this increase.

The productivity of animals depends upon their inherent capacity to produce and the environment they are called upon to use. The last 50 years have seen considerable changes in the environment of the sheep pastoral areas of this State. More subdivision fencing has been erected and there are more and better watering facilities, so the sheep can use the available pasture to greater advantage. It is probable that these changes have contributed largely to the increase in the average cut per head.

During the last 25 years, the Merino stud sheep industry has developed rapidly in Queensland and the Merino Stud Sheep Breeders' Association now has 72 member studs. This has been due partly to the granting of special leases by the Queensland Government. It has also been due to the difficulties experienced by Queenslanders in securing sheep suited to the semi-arid tropical regions of this State.

Queensland is probably the only country in the world with a major aggregation of wool-growing sheep in the tropics. Research completed during the last 10 years has focussed attention upon some of the problems of sheep breeding in these areas. It has also demonstrated the need for selecting sheep especially able to adapt themselves to the hot weather experienced in the west.

Present research aims at devising methods of selecting sheep capable of adapting themselves to the tropics, but in some ways their development may set further problems for the stud master. The greater the number of factors for which he has to select, the more difficult his task becomes. If one or two factors are of paramount importance, they may limit selection severely.

Examples of this were observed at the Sydney ram sales in 1952 and 1953. Prominence has been given lately to polled Merino rams. It is claimed that these sheep are not so predisposed to blowfly strike and that as a result rams of this type sire more lambs. Polledness in sheep is a dominant character, but it appears that more than one gene is responsible for polledness. In the homozygous (i.e., pure-breeding) state polledness is manifest by the occurrence of clearly defined well-like depressions on the temporal region of rams, where the horns usually originate. Only 10 of 60 so-called polled Merino rams offered at the Sydney sales in 1952 had heads of this type. Only 3 of the 25 so-called polled Merino rams offered in 1953 had heads completely indicative of homozygosity for polledness. The others carried scurs of various sizes, indicating that the character for horn growth had been retarded or modified but that it had not been completely abolished. This meant that wool-growers wishing to purchase rams as foundation sires for polled stud had to choose from very few animals.

Unfortunately, not all the rams which had the desirable head shape were covered with a well-grown, heavy, even fleece. Therefore, buyers wishing to obtain the character of polledness had to sacrifice other qualities which might be considered essential.

In the course of giving assistance this year to stud masters in the selection of sheep, it has been possible to measure the probable rates at which the cut per head of their flocks can be increased.

The choice of parents is one of the objects of culling, classing and selecting sheep. Various factors have to be considered, such as type and conformation, constitution and cut per head. The last determines the return from the sheep. For this reason, it has been studied carefully. C.S.I.R.O. workers, as well as those in other countries, have made estimates of the heritability of various characters. This is a measure of the proportion of increase in the average cut per head of a flock resulting from classing that is passed on to the offspring. The uses of fundamental information of this type have been demonstrated to stud and flock masters by weighing the fleeces of sheep classed into and culled from the flocks. The results have shown that, in many cases, the maximum advantages are not obtained from selection. This restricts the rate at which progress can be made. The wool laboratory provides facilities for more accurate methods of selection.

Some stud breeders now realise how they can increase, by threefold, the rate of improvement in their flocks. This improvement can be reflected in flocks which draw rams from the studs using more accurate methods of selection and breeding plans designed to give faster rates of progress.

The most interesting fact emerging from these studies is that it was impossible for the stud sheep industry to have contributed largely to the increase in the average cut per head of sheep in Queensland over the last 50 years. During that period, about 10 sheep generations have passed through the hands of Australia's stud breeders. If the studs had been responsible for the whole of the increase of 2.15 lb. in the average cut per head it would mean the rate of improvement would have been 3.475 oz. per sheep generation. About 30% of the increase in the cut per head resulting from classing is passed on to the offspring. This means it would have been necessary, as the result of classing, to maintain an overall increase of over 10 oz. of greasy wool in the average cut per head of both ewes and rams. This would call for extremely accurate and intensive selection. Even if accurate methods of selection were used, it is clear from a study of the lambing figures that reproduction rates were so low that intense selection could not have been practised.

Fat Lambs on the Coast.

Owing to high lamb and wool prices and the publicity given to this means of augmenting farm income, interest in fat lamb raising has increased considerably during the past year.

In some cases, comparatively heavy losses have been incurred by farmers who did not have a full understanding of the problems involved, but every effort is being made to provide them with advice and assistance. The success already achieved by some fat lamb breeders serves as a demonstration of what can be achieved by correct husbandry practices.

RESEARCH WORK.

Toorak Field Station.

The adverse seasonal conditions which prevailed in the Julia Creek district restricted the amount of research work which could be done on the Toorak Field Station, The property was acquired in 1951 and the greater part of that year was taken up in developmental work. Sheep were purchased during November and December 1951, but the complete absence of summer rain in 1952 led to severe drought conditions prevailing until January 1953.

Hand-Feeding of Sheep in Drought Time.

Hand-feeding of sheep during drought time has never been popular in north-western Queensland. Great distances make the cost of transporting fodder extremely high; labour charges incurred in the distribution of fodder are also considerable.

Work conducted by C.S.I.R.O. had shown that the intermittent feeding of sheep was of advantage during drought time. It was found that this practice reduced losses, led to better wool growth and saved labour. However, the C.S.I.R.O. work had used sheep confined in small yards and it was decided to conduct some trials on the Toorak Field Station to determine how the intermittent feeding of sheep could be applied under field conditions in north-western Queensland. The trial was designed to see if the size of the paddock in which the sheep were depastured influenced the overall result obtained from intermittent feeding. Four treatments were employed—

(1) Daily feeding in a small paddock.

(2) Weekly feeding in a small yard.

(3) Feeding twice a week in a large paddock.

(4) Feeding once a week in a large paddock.

The sheep confined in the small yard and fed once a week developed scours, probably as the result of salmonellosis. They were moved, therefore, to a small paddock.

Peppin and South Australian Merino sheep were used and they were divided so that there were 125 animals of each strain in each group.

The results showed that present methods used by the industry in hand-feeding sheep will have to be modified to make intermittent feeding a success. It was necessary to muster the large paddocks, which were up to 8,000 acres in area, to bring the sheep onto the feed. This necessitated a good deal of work, which was not required when feeding sheep in the small paddocks. The time required each week when feeding sheep in the small paddock was one hour, and 13 hours were required each week to muster and feed the sheep which were fed weekly in the large paddock.

The sheep in the small paddocks soon learnt to eat. A fair proportion of sheep remained non-eaters in the large paddocks in which sheep were fed intermittently. It is considered that many of the sheep which refused to eat maize could have been lost if suitable precautions had not been adopted. It was also necessary to feed the sheep in the large paddocks more heavily to maintain their weights.

An interesting strain difference was noted as the trial proceeded. The weights of the individual Peppin sheep came closer together under continued feeding, but the position was reversed in the case of the South Australian sheep; that is, the amount of variation decreased within the Peppin group, but increased within the South Australian group.

Urea Feeding Trial.

The pastures in north-western Queensland are frequently deficient in protein. The protein in the grass is the raw material from which sheep make wool. There is usually ample protein while the grass is growing after rain. However, during the dry winter and spring months the nutritive value of the pasture decreases very considerably. Feeding protein supplements during periods of deficiency is expensive and it is doubtful if sufficient protein is available.

Urea, which contains nitrogen, is a by-product of certain manufacturing processes. C.S.I.R.O.'s Division of Biochemistry and General Nutrition in Adelaide found that sheep confined in pens were capable of utilising the nitrogen in urea, and increased wool weights resulted.

A trial, in which C.S.I.R.O.'s Division of Biochemistry and General Nutrition and the Sheep and Wool Branch are co-operating, has been in progress on Toorak Field Station during the last 12 months to determine the field applications of feeding urea as a protein substitute during periods of protein deficiency. Difficulties have been experienced because the sheep cannot use the nitrogen in urea if it constitutes more than 25% of the total nitrogen intake. The nitrogen content of the pastures was so low during the 1952 drought that this condition was not satisfied.

Adaptation to Environment.

Few studies have been made on the adaptation of sheep to the hot conditions which prevail in the tropics. Research during the last 10 years has focussed attention on the effect of hot weather upon the fertility of rams. However, field observations confirm that rams bred in the tropical environment work better and beget more lambs than rams introduced into the tropics from temperate Australia. Field studies were commenced during April, 1953, on the adaptation of Merino rams to the tropics. Marked differences between the tolerance of different animals to hot conditions were observed. The rams were then mated singly with ewes, and conception rates are being studied to determine, *inter alia*, the extent to which fertility can be directly related to heat tolerance.

Surgical Treatment Against Blowfly Strike.

Since the more widespread application of the Mules operation to large flocks, the importance of blowfly strike originating on the tail, as distinct from that originating in the crutch, has become apparent.

Work was conducted by officers of C.S.I.R.O. on the effect of tail length and method of tailing on fly strike. As a result, the importance of turning the ventral flap of bare skin over the severed stump of the sheep's tail, and of docking the tail level with the tip of the vulva, was demonstrated.

Later the value of removing a piece of skin from the woolgrowing surface of the tail stump was established. This drew the bare skin from the under surface of the tail and virtually left only a small area of woolgrowing skin on the outer surface of the tail.

Satisfactory results have been reported by woolgrowers in Queensland who have used these methods. However, some opposition to the use of the Mules operation has been expressed by members of the sheep industry because they consider surgical treatment of the sheep's breech to be rather cruel.

In New South Wales, where the performance of the Mules operation on a large number of flocks is handled by contractors, a more radical method of treating the sheep's breech has been developed. This was demonstrated to people who attended the meeting of the Joint Blowfly Committee which was held in Sydney in August 1951. As this Department has undertaken considerable extension work on blowfly control measures, it was felt that a trial should be undertaken to determine if this method of surgical treatment of the breech of the sheep demonstrated to the Joint Blowfly Committee was more efficient than methods already in use in Queensland in protecting flocks against blowfly attack.

In addition, it was desired to observe the way in which the sheep healed and the time it took to perform the operation, as well as to gauge the owner's reaction. The sheep were treated at "Manfred," Payne Siding, between 2 February and 25 February, 1952.

Although a fly-wave of short duration occurred in August, 1952, insufficient sheep were struck in the treated groups to show any difference in the degree of protection afforded. It was considered that the stretching of the bare skin of the perineum of the sheep treated with the radical operation was not as satisfactory as that of the sheep which were treated with the Mules operation. It took much longer to treat the sheep with the radical operation and at present there seems no reason to change the method of treatment now in use.

Work under Wool Research Trust Fund.

Observations on Neo-natal Mortality of Lambs.—Observations on neo-natal mortality amongst lambs were continued on a property in the Longreach district. The seasonal conditions were favourable and 84% of lambs were marked. However, 24% of all lambs born died before attaining marking age. The other salient features which emerged from the observations were—

(1) The highest lamb-marking percentage recorded for a trial at Longreach (84% compared with 39% in 1951 and 78% in 1950-51) was obtained. A high percentage of twin births were recorded; 32% of the lambs born were from multiple births. Milk yields were higher than previously recorded for Longreach.

(2) Two age groups were represented. The performance of the older (1947 drop) ewes was consistently better than that of the younger (1949 drop) ewes. The lambs from the older group were heavier at birth and at marking. There were more multiple births in this group and a lamb-marking figure of 92% was recorded, compared with 77% for the younger ewes.

(3) In confirmation of past observations, lambs born to ewes with unsound udders had a significantly higher death rate (22% in first 3 days after birth) than lambs born to ewes with sound udders (6%).

Observations on the Milk Yield of Ewes.—Marked differences have been observed on several occasions in the rate at which lambs in semi-arid Queensland gain weight during their first six or seven weeks of life. This has varied between 10 oz. per day and 4 oz. per day. While there have been differences between the average weight gains of all lambs on different properties and in different years, there have also been differences between individuals.

It was also observed that the average birthweights and daily gains of lambs born to ewes with abnormal udders were below those of lambs born to ewes with sound udders. However, as this work was not sufficient to explain differences between the rate of gain, observations were made on the milk yield of ewes in the Longreach district. Twenty-four ewes were selected for this purpose from a group of 500 under observation to determine the incidence and causes of neo-natal mortality. They had been bred on the property and 8 were 1947 drop and 16 were 1949 drop. They entered the trial the day after lambing and were divided into four groups, which were subjected to the following nutritional regimes:

PLANE OF NUTRITION.

—	First 3 Weeks.	Second 3 Weeks.
Group 1	High	High
Group 2	High	Low
Group 3	Low	High
Group 4	Low	Low

The sheep on the high plane of nutrition received 4½ lb. of lucerne chaff and 4½ oz. of maize per head per day. Those on the low plane received 1½ lb. of lucerne chaff and 2¼ oz. of maize per head per day.

Observations were made on the body weight of the ewes, their milk production and the liveweight gains of the lambs. The results are summarised in Tables 1 and 2. The level of nutrition of the ewe has a very marked effect on milk production, and at the lower level of feeding practised milk yield declined steadily over the six weeks' observations. When the level of feeding was varied after the first three weeks the milk production of the ewes which were taken off the high level of feeding fell to that of those which were on the lower level throughout. Milk production of the other group was increased when its plane of nutrition was raised.

TABLE 1.

MEAN DAILY MILK PRODUCTION OF EWES IN EACH GROUP.

Group.	Daily Milk Yield (Period 6 a.m.-9 p.m.)		
	First 20 Days.	Second 20 Days.	Whole Period.
	Oz.	Oz.	Oz.
High High ..	24·8	22·3	23·5
High Low ..	22·8	14·7	18·7
Low High ..	19·1	21·4	20·2
Low Low ..	19·4	14·6	17·0

TABLE 2.

MEAN DAILY WEIGHT GAIN OF LAMBS IN EACH GROUP.

Group.	Daily Gain (9 p.m. to 9 p.m.)		
	First 20 Days.	Second 20 Days.	Whole Period.
	Oz.	Oz.	Oz.
High High ..	7·9	5·7	6·8
High Low ..	7·7	2·9	5·3
Low High ..	6·4	6·9	6·7
Low Low ..	6·5	3·3	4·9

Environmental Factors Influencing Conception Rates in Merino Ewes.—The work on conception rates has shown that, in general, 70% of the ewe flock conceives in the first three weeks after joining begins. However, when severe climatic conditions such as drought occur at joining the ewes take longer to come on heat and the conceptions are evenly spread over the six weeks of joining.

Studies in the Sheep's Skin as an Organ.—The skin of the wool-producing sheep is an important organ. Besides providing protection and serving as an outlet for at least one form of excretion, the skin grows the sheep's principal cash crop. There has been a tendency in the past to neglect the skin, although sheep classers have talked about "density" for many years. Popular usage of this term refers to the number of fibres per unit area of skin. There is no clear evidence to indicate that the majority of sheep classers can choose sheep according to the number of fibres per unit area of skin surface.

The sheep classers' interest in density as such was probably stimulated by the introduction of the Vermont Merino from America in the early part of this century. Apparently the catch-cry "development for density" which resounded from one end of Australia's sheep lands to the other was believed. Development referred to the amount of wrinkliness of the sheep's skin. It was argued that wrinkly sheep had greater skin area as well as more fibres per unit area. However, the disadvantages of this type of sheep became apparent, and unfortunately since then sheep men in Queensland have been inclined to overlook the influence of total skin area on cuts per head.

The fleece of the sheep is composed of a large number of fibres. Each fibre might be likened to a small cylinder of keratin with definite length and diameter which determine its volume. The weight of any fibre will be dependent upon its volume and specific gravity. However, the specific gravity of wool is constant, so that volume becomes the most important variant. The total weight of clean wool in a fleece will depend upon the average weight and hence volume of each fibre and the total number of fibres. While a good deal of emphasis has been placed on the number of fibres per unit area (known as density) many people do not realise the total number of fibres is determined by this factor and the total skin area.

The determination of fibres per unit area is fairly laborious. Thin sections of skin which have been cut parallel to the surface are examined microscopically, and the actual number of fibres counted. The sheep's skin contains two types of follicles, known as primary and secondary follicles. The former grow coarser fibres than the latter, from which the true wool is produced. There is usually a definite ratio between the number of secondary and primary follicles produced by any sheep. This varies between 14 : 1 and 40 : 1. During times of stress, the follicles which produce secondary fibres may decrease the rate at which they extrude wool keratin. Some may even go out of production. Changes of this nature may alter the evenness of the fibre diameter of any staple of wool. They can also alter the characteristic of the fleece.

Studies in the effects of alterations of this nature were commenced some years ago. Since then, work on sheep skin has been extended to include observations on abnormal wools grown by adult sheep. One of the most interesting cases investigated was an animal in the Clermont district. The greater part of the animal's fleece was of 70's count (average diameter of 18.20 microns) Merino type of wool. There was a large patch of 56's lustre type (average diameter of 27.0 microns) wool on the shoulder. Skin samples taken from adjacent areas growing fine and coarse wool were examined. The skin which grew the normal wool contained 538 secondary and 30 primary follicles in a measured area. A similar area of skin which grew abnormal wool contained 217 secondary and 23 primary follicles.

The ratios of secondary to primary follicles in the two samples were:—

(1) For skin growing normal wool, 17.9 to 1, which means 5.3% of the total number of follicles are primaries.

(2) For skin growing abnormal wool, 9.4 to 1, which means 9.6% of the total number of follicles are primaries.

It is clear, therefore, that there are only about half as many secondary follicles to each primary follicle in the skin growing the abnormal wool.

CATTLE HUSBANDRY BRANCH.

Mr. R. D. Chester, Officer in Charge.

Following the 1951 drought, both beef and milk production rose rapidly until July, 1952, when all immediate effects of the drought on production had disappeared. Beef and milk production for that month were buoyant. Relatively high production was maintained in both industries until the end of April, when dairy production commenced to fall, and during May and June production in this industry was low. Because beef production does not react so quickly to seasonal changes, the dry autumn and early spring did not have an adverse effect on turnoff during those months.

Beef cattle numbered 5,378,400 at 31st March, 1953, an increase of 4.7% over the previous year and the highest figure since 1925. The total of 1,373,000 dairy cattle is well below the figure for 1951, prior to the severe drought, though there was an increase of 76,300 during the year.

Slaughterings in the late summer and early autumn of 1952 were abnormally low because of the 1950-51 drought. As a result many cattle were not ready for slaughter until the spring of 1952.

Export killings began to improve during May, 1952, and this improvement continued for the remainder of the season. By the end of May, 1953, approximately 554,000 head of cattle had been slaughtered for export. This showed an increase of about 34% on the total export slaughterings for 1951-52. Although the season was deteriorating rapidly at the close of the year under review, good supplies of fat cattle were still available and graziers were anxious to dispose of these cattle in order to lighten their stocking rates during the winter and spring months.

For a number of reasons, export abattoirs in Central and South Queensland were unable to handle all the cattle available and as a result a marked decline in the market price took place during May and June. This inability of treatment works to handle all cattle available, together with the fall in price, has resulted in some marketable cattle being retained on properties.

In the event of drought conditions occurring during the second half of 1953, it is possible that some properties will be overstocked and serious mortalities may occur amongst breeding cows.

Spring calving was good and brandings during the autumn were above normal. Except for routes entering the State from Camooweal and Lake Nash during the early part of the year, all stock routes have been in good condition during the whole of the year and stock have been able to move freely.

Butter production for the year was 49,425 tons, which was an increase of 76% on the previous year.

GENERAL.

Extension and investigation work expanded considerably during the year. This was due chiefly to the improved staff position as well as to the fact that the Branch has now reached a stage where the results of early work are becoming available for use as a basis for an expanding service to the industries. The recruitment of four new graduate officers has added considerable strength, but great difficulty is still being experienced in finding older, adequately trained men to undertake extension work. This is a serious matter and an important limiting factor to the service which can be given to cattle raisers. The few trained men are spread too thinly over the cattle country. It is therefore difficult to give adequate attention to individual producers. More intensive follow-up by personal visits after field days and demonstrations is desirable. This will not be possible until more young men are trained.

The training of young men always presents a problem, particularly when the older, experienced field staff is short of requirements. A policy has now been adopted of placing a younger officer at the same centre as a more senior man and allowing the younger officer to do routine work under his direction. Although this has the disadvantage of concentrating staff rather more than is desirable, it has worked out well.

It might be desirable to give cadets experience on private properties under the guidance of enlightened managers in order to develop understanding of the problems of the industries from a grazier's point of view.

It is apparent that the majority of non-graduate staff must be recruited as youths direct from the Agricultural Colleges. Their initial training period in the Department will determine their future attitude to the job and their usefulness to the industry. It is important, therefore, that this training be adequate and soundly based.

Extension work in the dairy industry emphasizes the importance of improving the plane of nutrition of dairy cattle. This can be achieved by improved management and the provision of more good-quality roughage on the farm. Although the improvement of production through more enlightened breeding practices is important and must not be lost sight of, it is apparent that an immediate and large increase in production can be achieved in most dairy herds by ensuring that the cow always has enough good-quality roughage.

An increasing number of dairy-farmers are coming to realise that efficiency in production is important. It may be that there will be little further extension of dairy farming to new land and that increased production must be obtained by better land use and the production of more milk per acre. Improved nutrition alone could ensure substantial increases in turnoff from the present population of dairy cows.

In Queensland, there is a marked seasonal fluctuation in the nourishment available from pasture. Fodder conservation must be part of the farm programme on all dairy farms if year-round production is to be maintained. The extension drive has therefore concentrated on the provision of better pastures and crops and the conservation of surplus material for use during dry seasons.

In the beef industry most extension work has been concentrated in the areas of more intensive production, for it is in this area that greatest reponse to improved methods can be expected.

In areas of high and relatively reliable rainfall north from the Tropic of Capricorn, many cattlemen have become dissatisfied with the results they are obtaining from British breeds of cattle. These men are turning to Brahman crossbreeds. Few, however, have any clear-cut idea of what they are trying to achieve or how to go about it. Attempts are being made to improve breeding programmes wherever contact can be made with cattlemen embarking upon cross-breeding programmes.

IMPORTATION OF CATTLE.

Following the introduction to Queensland last year of the first consignment of Santa Gertrudis cattle, it is of considerable interest to report that five Afrikander bulls (see Plate 11, page 31) were this year imported by C.S.I.R.O. for use on Belmont Cattle Research Station.

This is the first importation of Afrikander cattle to Australia. The bulls were purchased from the King Ranch in America. No heifers were included in the original importation but two have arrived since. It is intended to use the cattle in cross-breeding experiments.

A further importation of Santa Gertrudis cattle was made by the Company making the original purchase and a stud herd is now established in the Warwick district. Bulls from the original importation have been sold to Queensland cattlemen and have been distributed to several districts in the State and in the Northern Territory.

PURCHASED FODDERS.

The dairying industry in the Brisbane area depends to a large extent on the purchase of fodders, particularly concentrates from the Roma Street market. To a lesser extent lucerne hay is also purchased through the market. Outside the metropolitan area many of the milk-supply dairies feed concentrates which are purchased chiefly as ready-mixed meals from Brisbane merchants.

From 1946 to 1952 there was a tendency for the price of concentrates to rise steadily. From May 1951 to July 1952, prices for both roughages and grains were extremely high and supplies uncertain. At one stage in December 1951, lucerne hay reached a record price of approximately £50 per ton. The relationship between hay costs and milk prices is shown in Fig. 1.

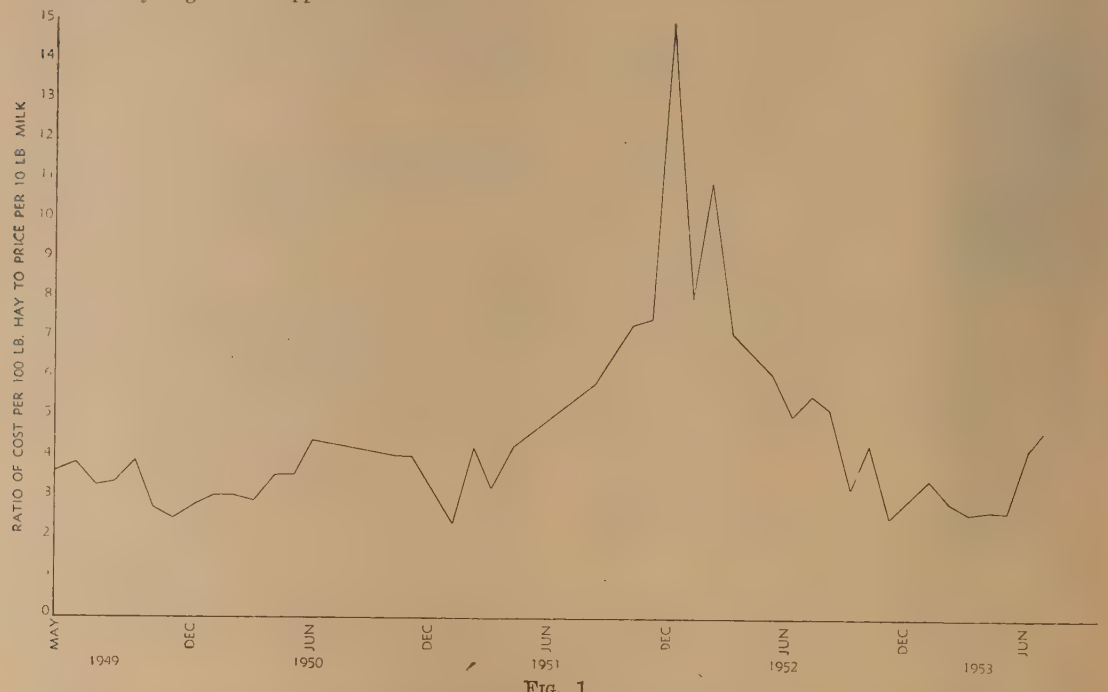


FIG. 1.

GRAPH SHOWING THE RATIO OF THE COST OF 100 LB. OF LUCERNE HAY ON THE ROMA STREET MARKET TO THE PRICE OF 10 LB. OF MILK ON THE METROPOLITAN MARKET FROM MAY, 1949, TO JUNE, 1953. It will be noted that there is a considerable variation from month to month in this ratio and that during 1951-52 drought fodder costs reached highly unprofitable levels. Further, apart from the drought period there has been no great permanent change in the cost price ratio during the 4-year period.

There is always a considerable difference between the minimum and maximum prices of hay during any one year. Generally hay is most expensive in the spring and cheapest in the late summer and autumn, but this is not always so. In order to buy on the best market, farmers must have some guide to costs in relation to food value of various fodders. A list containing the food unit cost of each fodder on the Roma Street market is supplied to the Queensland Dairymen's Organisation each week for publication in their official newspaper. Farmers who make use of this service can save themselves a great deal by buying the lowest priced fodder at the most advantageous time.

KAIRI REGIONAL EXPERIMENT STATION.

Seasonal conditions at Kairi Regional Experiment Station, although satisfactory from most points of view, were unfavourable for high production in the latter part of the lactation. A policy of spring calving of the herd has been adopted, as it is clear from results in herd recording groups that cows calving in the spring are likely to produce more milk than those calving at other seasons. Most cows in the herd would therefore normally complete 300 days lactation in July or August. Particularly dry conditions in April, May, and June caused a rapid fall in milk yield and premature drying-off of most of the herd. Production per cow in June was lower than for the two previous years. On the other hand, production during the first 200 days of lactation was very satisfactory, and the average yield of slightly over 200 lb. of butterfat per cow for the year is in all the circumstances good.

The herd consisted of a total of approximately 80 head of stock of all classes, of which 36 were in milk during some part of the year. No new purchases were made. The bull "Boree Efforts Warrior" was sold to a local farmer with the right to repurchase at the end of two years. One heifer was culled from the herd for low production and sold for slaughter.

A.I.S. steers used in a calf-feeding trial in 1951 were transferred to the Department's station at Utchee Creek, South Johnstone.

The 36 milking cattle consisted of 19 cows purchased to form the original herd, 2 cows bred on the station and completing their second lactation, 11 first-calf heifers bred on the station, and 4 identical twins purchased for experimental work. (Plate 9, page 31).

No concentrate fodders were fed to the adult stock. First-calf heifers receive a concentrate meal mixture at the rate of 3 lb. of meal per gallon of milk produced in order to ensure satisfactory growth and production.

Good progress has been made during the year in the subdivision of paddocks and the provision of adequate water. The herd can now be grazed on fresh pasture as frequently as need be and there are sufficient paddocks for the segregation of dry stock from the herd. A system of strip grazing of lucerne/Rhodes grass pastures has been decided on but was not put into operation this year because of insufficient supervisory staff. It is hoped to operate it next season.

The excellent production during spring and summer months indicated that this policy of providing adequate roughage in the form of silage when the season is dry and hay during the lush part of the season was well justified.

No further steer calves were raised during the year, as trained staff was inadequate to supervise the feeding routine properly. The A.I.S. steers raised in 1951 did not grow at a satisfactory rate because of the unfortunate start they received as calves. The growth rate of heifer calves has not been entirely satisfactory during either their pre-weaning or post-weaning life. Jersey calves reared on the Station, although apparently healthy and thrifty, grow at a slower rate than the standard American growth rate. It is intended to give special attention to growth rate in this year's heifer calves. By increasing the percentage of milk fed, as well as providing a supplementary ration, an effort will be made to maintain a growth rate equivalent to the American standard.

Heifers calving at an average age of 24 months this season produced an average of 166 lb. of butterfat per head. Six of these heifers produced more than 200 lb. of fat, whilst two were poor producers and produced less than 100 lb. of butterfat. These figures are considered to be highly satisfactory, but it is thought that they may be improved if better growth rates can be maintained during the first 12 months of life.

Seven heifers sired by the first bull used at the Station, "Boree Efforts Comet," have now completed a lactation. They averaged 198 lb. of butterfat. Four of the heifers were above herd average and three were below herd average. It was decided to delay consideration of repurchase of the bull for another season in order to obtain more information on his progeny.

RESEARCH STATIONS.

During the year, a herd of 294 Hereford cows was purchased and placed on Brian Pastures Research Station, near Gayndah. Eight Poll Hereford bulls have also been purchased for mating with this herd. Many of the cows were pregnant at the time of purchase and over 150 calves have already been born.

Yards and subdivision are not yet available, so no experimental work has been commenced. Work is now under way on stockyards and fencing and it is anticipated that it will be possible to start experimental work in the spring.

An officer of the Branch has been stationed on the property to care for the cattle.

Facilities are not yet available on Rocklea Animal Husbandry Station for experimental work. Approximately 10 sets of identical twins have been purchased and placed on the farm and a small breeding herd of Hereford heifers was recently purchased.

BUSH HAY CONSERVATION.

Losses of breeding stock and calves occur almost every year in large areas of the northern cattle country. This applies particularly to those districts where the possibility of producing fodder by the use of agricultural crops appears to be remote because of the unreliable nature of the rainfall.

Freight charges are such that it is rarely economically possible for graziers to purchase and transport fodders even if these are readily available in agricultural districts at reasonable prices. Unlike sheep, cattle require roughage fodders even for drought relief and the cost and difficulty of handling these is usually very much greater than is the case with concentrates.

Few cattlemen have tried to conserve pasture hay. Normally there is a considerable surplus of grass at the end of the wet season; this quickly matures, loses its palatability and nutritive value and becomes a serious fire hazard in the spring.

In order to obtain information on the economics of bush hay conservation and to determine the value of such hay as drought relief fodder, as well as to demonstrate the possibilities of modern haymaking machinery, the Department commenced a haymaking demonstration during the autumn.

With money made available from the Commonwealth Extension Services Grant, a hay baler and other plant was purchased and taken to the Central Highlands, where about 70 tons of hay was made on two properties (Plate 12, page 31).

The project did not start until rather late in the season and pastures were past the best haymaking stage.

Chemical analysis shows the bluegrass and Mitchell grass hay to be equal in feeding value to poor-quality cereal hay. From 15 cwt. to 24 cwt. per acre was obtained. Approximately 70 tons of hay was pressed in 65 lb. bales and stacked at a cost of about one shilling per bale for labour and fuel. During the spring this hay will be fed to cows and calves in order to measure its value to these animals.

GROWTH RATES OF BEEF CATTLE.

In the Queensland environment cattle grow and fatten during the summer and autumn but usually lose weight during winter and spring. The duration of the period when growth is satisfactory varies considerably from district to district but generally diminishes towards the north and west from the south and east.

The seasonal fluctuation in growth has two important effects. Firstly, cattle which grow for part of the year, then lose weight, take much longer to reach marketable weights than do cattle which grow constantly throughout life. Secondly, seasonal fattening shortens the time when fat cattle are available for slaughter. Thus, instead of a steady flow of fat cattle being available throughout the year, large numbers are available for a few months in the late autumn and early winter. For this reason, costs of slaughter and handling of meat are excessive and the State is unable to maintain a steady supply of meat on the export market.

It is desirable that the growing period be lengthened and that the trough in slaughterings during spring and summer be filled.

In order to obtain data on the growth rates of cattle in various districts in Queensland, cattle weighbridges are being installed on the properties of selected graziers willing to co-operate with the Department. At the same time, the economics of fattening on improved pastures and crops is being investigated. Where possible, a comparison is being made between growth rates of British breeds of cattle and Brahman-cross cattle (Fig. 2). Scales have either been installed or are on order for properties in the following districts:—Mt. Garnet, Ingham, Rockhampton, Central Highlands, Moreton, Darling Downs and Texas. It is intended to extend this work considerably.

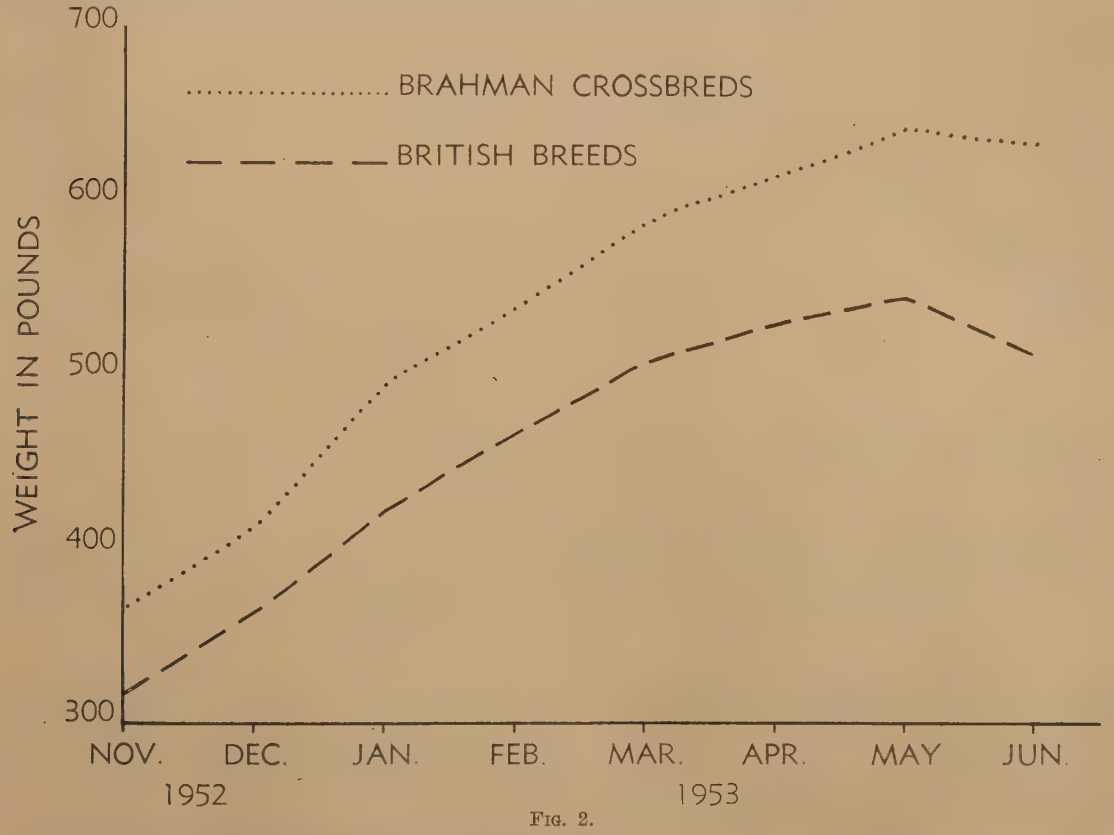


Fig. 2.

Graph Showing the Comparative Growth Rates of Young Cattle of Brahman Crossbreeds and British Breeds in North Queensland During the Period November, 1952, to June, 1953.

MINERAL DEFICIENCIES.

Work on the definition of mineral-deficient areas in the beef and dairying districts was continued. Only phosphorus and copper deficiencies have yet been diagnosed. It is possible that trace elements other than copper, paricularly cobalt, may be of some moment, but it is thought that they are unlikely to be of the same importance as phosphorus and copper.

Phosphorus Deficiency.

Phosphorus deficiency is widespread in the northern beef country particularly, but it is also important on the eastern coast. Fairly large areas of dairy country where paspalum and mat grass (*Axonopus affinis*) are the dominant species are also phosphorus-deficient.

Bonemeal fed as a source of phosphorus in the concentrate mixture of dairy cows has given good results. The general well-being of the cows is improved and production increased considerably. In these demonstrations it was necessary to feed large quantities of bonemeal to get satisfactory results, as much as 8 oz. of meal being fed to Jersey cows producing 30 lb. of milk per day before a normal blood phosphate level could be established in the cow.

Where only 1 oz. and 2 oz. of bonemeal was fed to cows producing more than 25 lb. of milk per day, blood phosphate levels sometimes did not rise above 2·5 parts per million.

Some success has been obtained by adding superphosphate to the drinking water of beef cattle in Central Queensland. This method has advantages over the lick methods of administering phosphate in beef cattle country where artificial watering places are used. Heifers receiving phosphate in this way grew more rapidly than similar heifers on phosphate-rich licks.

An effort is now being made to design and build a phosphometer which will regulate the flow of concentrates into the water troughs in order to maintain a constant predetermined concentration of phosphate. The first of these machines is now being made and will be tried out before others are manufactured.

Copper Deficiency.

Several new areas of copper deficiency have been defined during the year. It is now apparent that most marine plain country on the eastern coast is copper-deficient. There are also fairly extensive areas of deficient country in the dairying areas of the south-east, particularly paspalum pasture country on the coastal lowlands.

Trials with topdressing of copper, lime and superphosphate have so far failed to give a satisfactory response in growth rate of cattle (Fig. 3). The amounts used are being doubled.

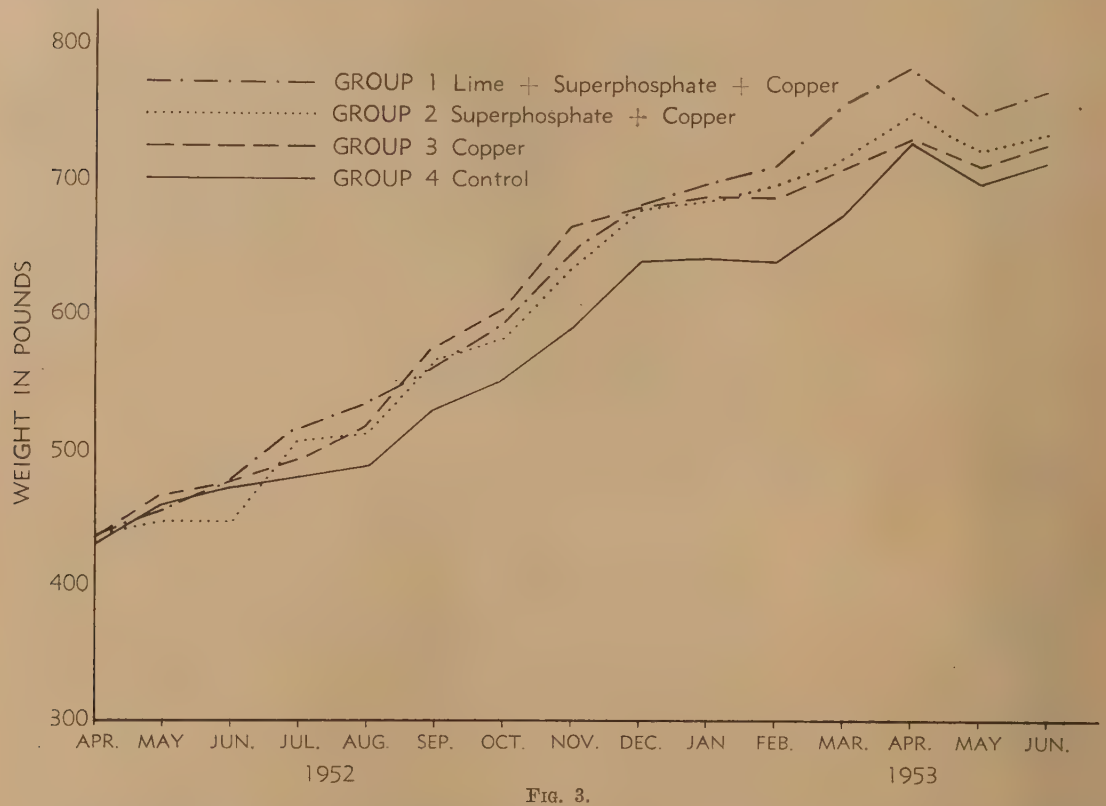


Fig. 3.

Graph Showing the Growth Rates of Heifers Grazing on Topdressed Copper-deficient Country in South-Eastern Queensland. The experimental paddocks were stocked at the rate of approximately 1 beast to the acre. Group 1 were grazed on pasture topdressed with lime (1 ton to the acre), superphosphate (1 bag to the acre), copper sulphate (10 lb. to the acre); Group 2 on pasture topdressed with superphosphate (1 bag to the acre) and copper sulphate (10 lb. to the acre); Group 3 on pasture topdressed with copper sulphate alone (10 lb. to the acre); and Group 4 on pasture receiving no treatment.

One gram of copper sulphate per day, fed in the concentrate meal to dairy cows in the Woongoolba district, has failed to give a response in the form of increased milk yields.

The addition of copper sulphate to the drinking water of beef cattle in the Broadsound district gave an appreciable response when judged by eye appraisal of the condition of cattle.

The intravenous injection of 50 c.c. of 0·5% solution of copper sulphate has effectively raised blood copper levels from subnormal to normal and the effect has persisted for three months. Treatment by intravenous injection has been most effective in curing clinically affected animals.

Some 250 cattle at Mooloolah were treated as a prophylactic measure during June. Some of these

animals had extremely low blood copper levels. Their response to the treatment will be watched with great interest.

CONCENTRATE FEEDING DEMONSTRATIONS.

The feeding demonstrations with various concentrate fodders carried out under the Commonwealth Dairy Efficiency Grant in six districts were concluded at the close of the financial year. A modified demonstration will be commenced in one district in the new year.

The results of feeding small amounts of grain were generally disappointing from the point of view of increasing milk yield and as an economic means of so doing.

Small increases in milk yield were obtained by feeding grain and high-protein concentrates, and in some instances greater increases in yield resulted from high-protein concentrates as compared with straight-grain concentrates, but in no case was the increase sufficient for the value of the milk produced to show a profit over the cost of the grain at current market prices of milk and grain. Only if farmers used homegrown grain could this method of feeding prove profitable.

There are, of course, many aspects other than a comparison of returns from extra milk and cost of grain to be considered. Fed cows are undoubtedly easier to handle in the yard. They are more contented in the bail. There is an indication that the duration of lactation is increased. Weight at the end of lactation is usually greater. There may possibly be a beneficial effect on the following lactation which was not measured in these trials.

Indications are that before concentrate feeding can be most effective adequate good roughage should be available to the cow. Only when cows have all the good-quality homegrown roughage they can eat will they give adequate response to purchased concentrate feeds. The demonstrations indicate that a few pounds of high-protein concentrate cannot replace good roughage.

The most important finding from these demonstrations is that most dairy cows in Queensland receive insufficient good roughage. They emphasize the importance of pasture improvement, crop production and fodder conservation in efficient dairy farming.

CALF-FEEDING TRIALS.

These were continued during the year. Demonstrations are now being undertaken on seven properties. The demonstrations have concentrated on methods of rearing calves on small amounts (15-20 gallons) of milk (Plates 6 and 7, page 29).

Calves can be reared successfully on amounts as small as 15 gallons, but such calves are apparently more susceptible to calf diseases, such as parasitism, pneumonia and enteritis. Careful attention must therefore be given to rotational grazing if serious losses are to be avoided. Briefly, the following conclusions can be drawn from the work:—

(1) The growth rate of A.I.S. calves subsequent to weaning is considerably lower than the American standard for similar breeds.

(2) The growth rate of Jersey calves on Kairi Regional Experiment Station is lower than the American standard.

(3) Nipple feeding was ineffective as a means of increasing growth rate of bucket-fed calves. It was effective in controlling sucking and therefore could be important as a means of disease control.

(4) Calves were successfully reared on 15 gallons of milk, being weaned from milk to meal at four weeks of age.

(5) Calves were successfully reared on skim milk at the rate of 7·5% body-weight per day for 7-8 weeks. These calves were also fed a high-protein calf starter.

(6) There was no difference in growth rate between calves receiving meal as a gruel and as dry meal.

(7) Antibiotic supplements fed to calves had no effect on growth rates.

DEPRESSED BUTTERFAT YIELD.

Low butterfat percentage in milk for sale on the metropolitan market causes considerable inconvenience and loss to farmers in some districts. There are many causes for this low fat content of the milk, the chief propably being the inherent capacity of the cattle. However, a possible contributing cause is the lack of long roughage in the diet.

In co-operation with the Dairy Research Branch, trials have been conducted to obtain information on this point. Following good results obtained by feeding long oaten hay to one herd in the Beaudesert district in 1951, it was decided to repeat the experiment in an attempt to confirm earlier results. Feeding trials on two farms in 1952 gave inconclusive results.

The work will be repeated in the spring of 1953, using homegrown Sudan grass in place of purchased oaten hay.

FEED INTAKE ESTIMATIONS.

In order to asses the production potential of a milking herd at a given time, the milk yield must be compared with the nutrient intake. Yields can be measured at any time, and with total stall feeding intake can also be accurately measured. Measurement of intake of the grazing animal is more difficult.

A method of calculating the feed intake of cattle on pasture has been evolved by overseas workers. This method uses the marker technique, whereby a known amount of a totally indigestible material is administered to a number of animals in the herd. Simultaneously, faecal samples are collected and analysed for concentration of the marker. From this analysis the total daily passage of faeces can be calculated.

There is a close relationship between percentage of nitrogen in the feed and that in the faeces. With the amount of faeces voided and its percentage of nitrogen known, the amount of feed eaten can be calculated.

Two trials have been conducted in the Brisbane area (Plate 8, page 29), using six cows in each trial. These indicated that on these farms cows were unable to obtain sufficient dry matter to fill their paunch during a normal day's grazing and that the feed eaten was sufficient only to produce 18 lb. of milk per day on the one farm and 13 lb. of milk on the second farm. The actual production of each cow varied from 7 lb. to 21 lb. of milk. Pastures appear to be more deficient in food units (energy) than in protein. It is intended to extend this work during the coming year.

GRAZING BEHAVIOUR OBSERVATIONS.

An intensive study of the grazing habits of cattle has been made in several countries. Opportunity has now been taken to make observations on British breeds of cattle in the moist tropical environment of the Bureau of Tropical Agriculture (South Johnstone) and at Ayr Regional Experiment Station.

These observations have now been carried out for a period of 12 months and some interesting information has been obtained. In this environment cattle do most of their grazing during the night (Fig. 4). The amount of daytime grazing varies considerably according to the temperature and the amount of sunlight, but it never equals the night grazing.

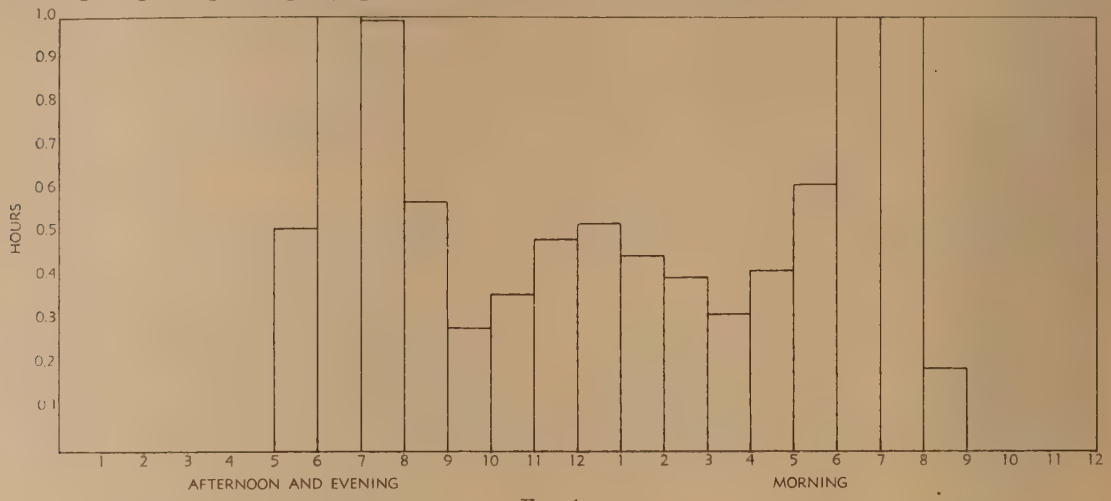


Fig. 4.

Histogram Showing the Time Spent by Steers Grazing each Hour over a 24-Hour Period at the Bureau of Tropical Agriculture, South Johnstone, North Queensland. It will be noted that the cattle grazed intermittently from 5 p.m. until 9 a.m., with two peak periods, one early in the evening and the other after sunrise in the morning. During these periods, cattle grazed continuously for more than two hours. It is significant that the cattle did not graze at all between 9 a.m. and 5 p.m.

These results have an important application in the dairy industry. They indicate that dairy cows in the tropical areas of Queensland should always be placed in a good paddock at night, as it is during this time that most of their grazing is done. The custom of using an overstocked paddock handy to the yards for a night paddock is revealed as very bad policy.

INFERTILITY.

Infertility continues to be one of the most important sources of economic loss in the dairy industry of the State. Temporary herd infertility in all its forms causes considerable trouble and inconvenience in all dairying districts. It is of particular importance in butter-producing districts, where planned seasonal calving can be an important means of increasing production.

A specialist officer was employed under the Commonwealth Dairy Efficiency Grant Fund to make a survey of the incidence of and causes of infertility in dairy cattle throughout the State. This officer took up duty in February, 1953, and is now engaged in a preliminary survey of the dairy districts of the State in order to contact interested farmers and obtain assistance from selected co-operators.

Further outbreaks of abortion due to vibriosis were diagnosed during the year and it is apparent that this disease is sometimes responsible for farmers believing that Strain 19 vaccination has been ineffective.

Two further herds, located on neighbouring farms in the Beaudesert district, were found to be infected with trichomoniasis. A bull from one of the farms is thought to have introduced the infection into the Moggill farm mentioned in last year's report, where trichomoniasis was first diagnosed in Queensland. There is a history of stock movement from a known infected farm in New South Wales to the Beaudesert farm.

Conception rates in the Moggill herd where artificial insemination was used to control trichomoniasis remain normal. It can therefore be considered that the method of control used in this herd was effective.

The late abortion of calves and early death of calves born in a weak condition have been reported from a number of farms in Queensland during the year. It has not always been possible to diagnose brucellosis or vibriosis on these properties.

Large numbers of cows infertile from unknown causes have been treated by the infusion of 40 c.c. of 33⅓% solution of sulphamezathine. The treatment was effective in 80% of all cows treated.

PIG BRANCH.

Mr. F. Bostock, Officer in Charge.

During the year Mr. V. A. Harrison, Cadet, was transferred to the Kairi Regional Station, commencing duties at Kairi on 11th July, 1953.

Mr. J. B. Aitken, Assistant Adviser, resumed duties at H.O. after annual leave on 23rd September, 1953, having been transferred from Kairi and on 2nd February, 1953, was detailed for duties in connection with the Commonwealth Extension Services Grant.

Mr. K. J. Hutchinson, Assistant Husbandry Officer, tendered his resignation, which took effect on 1st May, 1953. Mr. Hutchinson accepted a position with the South Australian Government.

The following gives an indication of the work carried out by Officers of the Branch during the year:—

Farm visits	2,769
Pig sales attended	91
Meetings attended	39
Field days	18
Bacon factory visits	100
Shows attended	37
Demonstrations given	37
Lectures given	33
Regional Experiment Station visits	121

The Assistant Husbandry Officer rendered assistance to the various field officers on specific technical matters related to problems in feeding and husbandry that were encountered during the course of their field duties. He also carried out an itinerary embracing the Atherton Tablelands, the major purpose being the showing of three films to farmer audiences. Opportunity was made available for short comment and questions between each film and an informal general discussion of district problems. Comments by farmers on film screening compared with other extension means were so favourable to films that it is strongly recommended that similar trips be undertaken to the other main pig-producing areas as opportunity offers.

PRODUCTION.

Production figures for the year reveal a small increase in the numbers of pigs slaughtered. This is attributed mainly to improved seasonal conditions and the availability of cereal grains and protein supplements. The price of these types of foods and the continued shortage of cement, water piping and fencing wire are factors militating against any great increase in production.

The quality of the pigs forwarded to market was reported to be very fair, but the overfat pig appears to be on the increase compared with last year, mainly, it is thought, because of the improved food and climatic conditions. The Australian Pig Society (Queensland Branch) and Bacon Factories launched an advertising campaign during the month of March, directed against the overfat pig, by attaching appropriate notices to all account sales sent to farmers and by distributing notices for display at saleyards, railway sidings, etc. It is hoped that this action will assist in reducing the number of overfat pigs marketed.

The problem is still one of major importance to the industry and likely to continue so under present marketing conditions, whereby, except for the area controlled by the Northern Pig Marketing Board, farmers receive the same return, weight for weight, for an overfat pig as for one with the most desirable proportion of fat to lean. A system of differential payments according to grade appears necessary to provide the incentive to market pigs before they become overfat.

Technical data from 11,572 carcases have been collected during the year and are at present being classified for use in the framing of suitable grade standards.

The contract price for pigmeats for export to the United Kingdom remained at 1s. 9½d. per lb. for first quality baconer pigs, which is substantially below the price asked for by the industry to cover cost of production and provide a reasonable margin of profit. As a result of the shortage of pigs, the local price has averaged over 2s. per lb. and is at present 2s. 3d. per lb. for first quality pigs weighing 60–160 lb. dressed weight, and 1s. per lb. for pigs 161–170 lb. dressed weight. The reduction in the top weight from 180 lb. to 160 lb. and the drop in price to 1s. per lb. for the 161–170 lb. carcase weight has been made to encourage the farmer to market his pigs before they become overfat. In addition, the home market trend is for lightweight carcases yielding small cuts.

An additional factor influencing the export of pigmeats to the United Kingdom is that frozen pork, cured bacon and ham, canned bacon and ham and salted pork may still be shipped on a trader-to-trader basis to all destinations other than the United Kingdom.

A recent survey, however, points out that overseas markets are not at present very favourable and that home consumption of pigmeats and pigmeat products is the most remunerative and should be encouraged.

STUD PIG SALES.

Reports received from the field staff have indicated a strong demand for breeding stock, and store sales have remained firm throughout the year.

The advantages to commercial breeders of using pure-bred stock are continually being pointed out and demonstrated by officers of the Branch. There is as a result keen competition for good blood lines in order to improve breeds.

In this respect the Royal National and Country Shows enable breeders to compare their pigs and provide the opportunity to purchase fresh breeding stock. The services of Pig Branch officers in the selection of stock is sought and much appreciated.

Realising that the selection of breeders on conformation or general appearance alone is not a guarantee that such animals will produce suitable porkers or baconers, the Department is planning to assist by the establishment of a Test Station at Rocklea. Results secured from such a Test Station would enable breeders not only to select on appearance but to secure information about utility factors such as the commercially important features of litter size, weight for age at slaughter, economy of liveweight gain and carcase quality.

CARCASE COMPETITIONS.

Cured baconer carcase competitions were again popular with Country Show Societies and are proving a very useful means of demonstrating to producers the type of carcase required by the trade. Entries have increased, as also has the number of show societies making provision for this type of competition in their schedules.

For the sixth successive year the Australian Meat Board, in association with the Department and with the co-operation of all sections of the industry, conducted baconer carcase competitions on a district basis. Judging was carried out and field days arranged at Mareeba, Rockhampton, Toowoomba and Brisbane.

The State championship was awarded to a pig of the Large White breed, bred in the Toowoomba area. The carcase, of 150 lb. dressed weight, secured the record score of 89½ points, was nicely proportioned and scored well in all points. A little more finish to the carcase would have resulted in an even higher score being obtained.

The 151 entries complying with the competition conditions had an average score of 74.54%, both the number of entries and average score being the highest yet recorded in Queensland. It is interesting to note that 79.47% of competing entries secured 1st class certificates and 17.22% 2nd class certificates, leaving only 3.31% which received no recognition. These figures indicate the high standard which these competitions have attained.

The average of each section judged over the 6-year period is given in Table 1, from which it will be noted that there has been an overall improvement of approximately 14% in carcase quality.

TABLE 1.

CARCASE COMPETITIONS: AVERAGE FOR EACH SECTION OF JUDGING.

	Possible Points.	1948.		1949.		1950.		1951.		1952.		1953.	
		Average Points Obtained.	Percentage of Possible Points.	Average Points Obtained.	Percentage of Possible Points.	Average Points Obtained.	Percentage of Possible Points.	Average Points Obtained.	Percentage of Possible Points.	Average Points Obtained.	Percentage of Possible Points.	Average Points Obtained.	Percentage of Possible Points.
By Inspection—													
Hams	8	5,604	70·050	6·27	78·40	6·097	76·213	6·44	80·52	6·286	78·571	6·67	83·37
Shoulders ..	7	5·562	78·029	5·92	84·57	5·849	83·564	5·92	84·60	5·947	84·959	6·02	86·00
Streak	12	6·764	56·367	5·57	46·40	7·766	64·724	7·41	61·79	6·982	58·185	8·29	69·08
By Measurement—													
Eye Muscle ..	28	11·775	58·875	18·04	64·42	14·262	50·936	20·15	71·96	19·114	68·265	19·15	68·39
Backfat Thickness	20	15·489	77·445	15·26	76·30	14·572	72·864	15·45	77·23	14·729	73·643	15·97	79·55
Body Length ..	20	12·500	44·643	13·06	65·30	13·388	66·941	12·98	64·92	14·814	74·072	14·99	74·95
Leg Length ..	5	3·111	62·220	3·02	60·40	3·281	65·631	3·21	64·22	2·757	55·142	3·27	65·40
Total ..	100	60·805		67·97		65·218		71·57		70·629		74·87	

RESEARCH.

An experiment to determine the effect of partial lucerne chaff substitution for grain in the ration on carcase quality of baconer pigs was completed. This trial was carried out in two sections. The first was more in the nature of a pilot trial. It was conducted at Kairi Regional Experiment Station, where results indicated a marked improvement in carcase grade of pigs receiving additional lucerne chaff. The mean excess of backfat measurement of the control group was 18 mm., while for the lucerne chaff group this was reduced to 12.3 mm. at comparable weights.

In the second trial, under more carefully controlled conditions, improvement in carcase quality was brought about by a restriction of 9% in mean backfat thickness and a marked reduction in the total area of fat in the loin section.

Feeding economics, other than increased labour costs due to the mean additional 10-day period taken to market pigs on the lucerne chaff ration, was considered. Because of its field nature, consumption and growth figures from the Kairi trial were used as an estimate of the economics of the practice.

Group estimates were as follows:—

(1) Grain saved due to substitution, 233 lb.

(2) Lucerne chaff consumed, 396 lb.

With the price of grain at £30 per long ton, the price of lucerne chaff would have to be £18 per long ton for feeding costs to be equivalent.

An exploratory trial involving the use of antibiotics was carried out in conjunction with the staff of the Animal Health Station, Yeerongpilly. The antibiotic preparation used was based on streptomycin and terramycin.

No conclusion could be drawn regarding the use of antibiotics, primarily because the extreme type of cull pigs used were not such as could be expected to respond to antibiotic supplementation in the ration. Such evidence as was obtained suggested that growth increases reported to be secured by using antibiotics may occur only in special circumstances. Differences in the nature and quality of the ration seem likely to govern varying response to antibiotic supplementation. Accordingly, pre-weaning and post-weaning tests have been designed for future work.

Additional observations on the use of the Hammond System of pig carcase appraisal were completed.

Following an earlier report dealing with differences between observed results and ideal measurements (Hammond) for Queensland carcase figures, it was requested that other States forward their results for analysis.

From the Queensland analysis the important relationship between overall marks and weight range was not particularly satisfactory because of insufficient numbers, although it gave some evidence of a downward trend or lower scoring in the heavy weight ranges. Subsequent grouping of the results of all States (1,695 carcases) confirmed this downward trend and provided strong evidence of an "overall bias" existing for measured characters, favouring lower weight ranges. An analysis of the results has been prepared for publication.

In co-operation with the Chemical Laboratory, investigations or the possibility of riboflavin deficiency in soup red to pigs was begun.

Because vitamin B type deficiencies are no doubt common in pigs fed mainly kitchen refuse, etc., the development of a satisfactory routine method for riboflavin determination should prove of very great value.

A satisfactory method has been worked out and assays made of fresh material as well as material cooked under various conditions and various lengths of time. In this way the required level of supplementation for garbage feed treated in different ways may be found.

Experimental work at present being carried out at Kairi Regional Experiment Station includes—

(*a*) Investigation of a number of plants and trees of the Northern Tablelands, suspected of being poisonous to pigs.

(*b*) A test to determine the palatability of peanut hay, it being thought that peanut hay may prove a cheap source of fibre for use in rations fed during the finishing-off stage of baconer pigs.

(*c*) A trial to determine the maximum amount of molasses which may be included in rations fed to pigs. Molasses is a low-priced feeding stuff on the Tablelands and pig producers in the area are seeking information on the maximum amount of molasses which may be substituted for maize or other grains without deleterious effects.

(*d*) The incidence of necrotic enteritis reported in the Tableland area, coupled with the practice of heavy maize feeding and inadequate protein levels, suggests that there may be instances of nicotinic acid deficiency. A study of the effect of nicotinic acid supplementation of a local maize and skim-milk ration is being made. It is hoped that these trials will yield valuable information.

GENERAL.

At Hermitage Regional Experiment Station the piggery buildings, yards, etc., have recently been completed and it is proposed to establish a Berkshire stud at this farm during the coming year.

The stud herd of Tamworth pigs at Kairi Regional Experiment Station has been maintained. One Tamworth boar and one sow were purchased during the year for use in this stud and it is hoped that these pigs will assist in the improvement and development of the type of Tamworth produced at the Station.

An experimental farrowing pen of unusual circular design is being constructed at Kairi to determine if it will assist in reducing the heavy mortality at present experienced among suckling pigs. Statistics show that from 20% to 25% of all pigs born in Queensland are lost between birth and weaning, the highest mortality occurring during the first few days after birth. Such losses are a major limiting factor in pig production and any method found to reduce this loss would be of considerable economic importance to the industry.

Brucellosis testing of stud herds, carried out in conjunction with the Veterinary Services Branch, has been maintained. Eighty-eight herds have been issued with appropriate certificates and placed on the list published in the *Queensland Agricultural Journal* each month; a further nine herds have entered the scheme, but have still to complete the necessary tests. These figures represent 78.86% of the registered stud herds in the State.

Work has been commenced in the Moreton area in connection with the Commonwealth Extension Services Grant. A large number of properties have been inspected, the object being to select eight farms suitable for the project it is proposed to demonstrate and also well situated to serve the respective districts from the standpoint of conducting field days.

In addition, one farm has been selected on the Atherton Tableland and one in Central Queensland in order to provide a service in these areas. Plans for the work proposed to be carried out are being prepared by the respective officers stationed in these districts.

Health of stock has been generally satisfactory, but salmonella infection continues to be responsible for moderate losses on many properties. On one farm in the Warwick district and one in the West Moreton area, leptospirosis has been reported as suspected of causing breeding troubles; investigations are at present being carried out in conjunction with the Animal Health Station, Yeerongpilly.

DISTRICT REPORTS.

North Queensland Area.

In this area the spring and early summer months were dry, but were followed by above-average rainfall in November. During the period January to March, rainfall nearly reached average, with many individual falls sufficient to cause flooding. The year ended with several weeks of dry weather accompanied by strong winds and a succession of severe early frosts. These seasonal conditions are reflected in the variation in supply and the general health of the pigs.

No increase in the number of pigs slaughtered was recorded, due it is thought to the heavy demands made for milk for human consumption during the dry spells and the temporary drop in price paid for pigs. With the general improvement of all farming during the wet season, demand for weaners and stores increased, following the restoration of pig prices to 2s. per lb. for first grade. The severe frosts will no doubt have a depressing effect on production during the coming spring.

The quality of the pigs marketed has remained at a high average standard, approximately 80% of all pigs handled by the factory being graded first grade. This is due to payment for weight and grade and continued extension work on the problem of overfat pigs.

During the year it was possible to devote greater attention to the coastal strip as far south as Ingham. Piggeries in this area were in very poor condition but considerable improvement is being effected in the standards of accommodation and management following extension work in the area. Attention has also been paid to breeding, feeding, management and accommodation in the Tableland areas, and as a result a number of new piggeries have been erected, better stock purchased for breeding and a better understanding of the principles of feeding and management achieved in many cases.

Supervision of the piggery at Kairi Regional Experiment Station was maintained throughout the year. Results so far indicate that the task of effecting improvement in the Tamworth breed will be a lengthy one. While rate of growth and economy of feed utilization are good, type is still early-maturing.

Disease did not reach serious proportions during the year. There were no outbreaks of erysipelas or Glasser's disease, and pneumonia cases were far below the average, but outbreaks of necrotic enteritis were noted. Tuberculosis continues to show a small decrease and is not a major cause of loss to the industry.

Of the deficiency diseases, two occurrences of calcium deficiency, involving approximately 30 pigs on two farms, were first detected at the Bacon Factory, and cures were effected amongst the remaining pigs by correcting the ration.

The continued campaign against parasites has had pronounced results, particularly with the roundworm (*Ascaris lumbricoides*). It is believed that the reduction in roundworm infestations is largely responsible for the lower incidence of pneumonia. Scrub tick caused very few losses during the year.

Spirochaetosis has given some trouble during the wet months, mainly in pigs of store and porker ages. However, prompt attention involving scrubbing of the lesions, washing with peroxide and frequent treatment with penicillin have effected almost complete cures.

The staff of the North Queensland Co-operative Bacon Association and the Northern Pig Marketing Board have given ready co-operation and assistance in extension work, and advice has been tendered regarding the operations of these bodies.

Central Queensland.

Production in this area appears to have remained static, although reports indicate that in addition many baconers are being forwarded to southern markets, due, it is thought, to the erratic prices offered and alteration of weights, without prior warning, during the year. These conditions have dampened enthusiasm somewhat. However, these matters have recently become more stable and markets offering the better returns have benefited.

A marked interest in type improvement has been observed and factories report considerable improvement in the quality of baconers received for processing. As a result, several breeders have been encouraged to establish purebred studs.

This improvement in quality is largely attributed to the interest taken in the various baconer carcase competitions. Entries for the cured baconer competitions have greatly increased and considerable benefit has been derived from discussions and the display of these carcases at local shows.

The grazing system of pig raising is increasing in popularity throughout the area, and advice regarding the benefits to be derived from better-type accommodation is being sought and heeded.

The health of stock has been satisfactory, but during the stormy weather experienced in the warmer months, numerous cases of photosensitisation were investigated. Mange infestation of white pigs was prevalent and has resulted in many producers favouring the coloured breeds.

A plague of grasshoppers throughout the Callide Valley caused much concern during midsummer, but the beneficial rains experienced compensated to some extent for the green feed ruined. Farmers were cautious, however, and the planting of grain sorghum crops was delayed. Fortunately, early frosts were not experienced this year, thus allowing these crops to mature.

Much greater quantities of grain are being fed to pigs throughout the area, and with advice given on their correct use successful results are being secured.

Burnett Area.

Although weather conditions were more favourable than in the previous year, there was a period from September to December when rainfall was below normal. These more congenial weather conditions for dairying resulted in a substantial increase in butter production and consequently a similar increase in skim-milk supplies for pig feeding.

Grain supplies were not plentiful, largely because of the dry conditions experienced during the last two seasons. Most farmers managed by rationing their grain stocks during the last few months in order to carry through until late summer crops were ready for harvesting. Fortunately, conditions were good and the harvesting of sorghum crops has made available ample supplies of stock food. As a result of unfavourable weather experienced for normal summer grain crops over the past few years, an increasing number of farmers are now growing winter cereals, with satisfactory results. This practice will assist the feed grain position throughout the district.

Forage crops for pig feeding were more plentiful, and protein supplements, due no doubt to the increased quantities of skim-milk, were readily available.

Production increased slightly, while the demand for good-quality breeding stock and stores remained firm, indicating a further increase during the coming year.

Darling Downs Area.

In the main, farmers have experienced a good year, although seasonal conditions have been erratic.

Feed grain supplies were adequate and the drop in price, other than for wheat, has encouraged farmers to feed more grain to their pigs. Protein supplements have been plentiful, and processed milk powders, although relatively high in price, are becoming available in increasing amounts.

The number of entries in baconer carcase competitions has steadily increased, and quality has improved, indicating that farmers are showing a greater appreciation of better-quality stock. This is borne out by the fact that the majority of stud breeders in the area have no stock available for sale over three months of age and many have made advanced bookings.

Diseases of pigs have received a good deal of attention in the area, especially under conditions of poor housing and sanitation. Salmonella infections have been in the majority, but recently an increase in breeding troubles has been noted which does not appear to be wholly related to nutrition. Investigations are continuing.

Warwick Area.

A great deal of ground has been covered in changing farmers' viewpoint from a somewhat guarded attitude towards Governmental services to the knowledge that useful advice can be obtained free of charge.

By a policy of being present at all places where pigs are handled and talked about, and a continual reiteration of basic facts of husbandry, farmers are now seeking Departmental advice and assistance.

Several new piggeries have been constructed and a wider interest in better housing is shown, but the average farmer needs to see a well-constructed piggery in order to appreciate the great margin between the average type and a really satisfactory layout. In this respect, the recently completed piggery at Hermitage Regional Experiment Station will be of considerable value and assistance.

In co-operation with the Veterinary Services Branch and Yeerongpilly Animal Health Station, a great deal of disease investigation has been carried out.

Losses of baby pigs and often entire litters, faulty growth and lactation failure have been experienced. Positive evidence of brucellosis was found on two farms and the presence of leptospira has been detected on several other properties. The effect of these organisms and the relationship to nutrition in a number of cases of post-parturient fever, &c., has not been finally determined, but investigations are continuing, as the economic loss is considerable.

Moreton Area.

Seasonal conditions were favourable during the first half of the year. Heavy flood rains occurred during February and considerable losses of crops and grazing, together with extensive damage to fencing, occurred in the lower areas. Dry conditions prevailed at the end of the year and heavy frosts were experienced.

Feed supplies have improved, animal protein supplements being more readily available than for years past. The feed grain position also improved and prices eased towards the end of the year, except for feed wheat.

Field work undertaken during the year followed the usual pattern, with accommodation improvement receiving more attention due to the material supply position being somewhat easier. More stud herds are entering the brucellosis-free herd scheme and more country Shows are insisting on only tested stock for exhibition. A close check is kept on the Shows to see that testing conditions are observed.

Demonstrations and lectures were given to Junior Farmers' Clubs. A lecture and demonstration to New Australian farmers who were doing a short course at Gatton College proved popular with these students. Their interest in pig raising was evident by their comments during discussions.

The Moreton area contains the greater portion of the State's garbage feeders. Considerable improvement in feeding and hygiene is necessary before these piggeries could be considered satisfactory. Steam cooking of food has been installed in one large piggery and more interest is being shown in this method. Snap inspections have been made of garbage piggeries and were intensified during the outbreak of swine fever in New Zealand.

Disease has been controlled by working in close co-operation with the Veterinary Services Branch. Outbreaks of pneumonia, Glasser's disease, sarcoptic mange and heavy worm infestation have been treated. The investigation into the effects of leptospira infection in brood sows is being undertaken by Yeerongpilly Animal Health Station and advisory officers in this area are co-operating. One heavy brucellosis outbreak occurred in the Albert River district, but by close contact between the Branch and the Yeerongpilly Animal Health Station, the herd concerned is now brucellosis-free.

Advisory services are becoming more popular and the number of requests for visits reflects a healthier tone in the industry.

POULTRY BRANCH.

Mr. P. Rumball, Officer in Charge.

The price of feed, the greatest single factor in cost of production in the poultry industry, has remained at a high but fairly stable level throughout the year and it now appears that farmers are accepting the position and adjusting their activities to enable them to meet the changed conditions. There is some evidence that farmers are increasing the size of their units and flocks to spread labour costs. Unfortunately, the cost of building materials places some curb on the rate of progress which can be made by many in this direction.

During the early part of the period under review, although cereals were in plentiful supply, protein-rich foods, which are so essential to economic production, were short and many proprietary mashes did not have a high protein content. Fortunately, during the crucial period of the year when replacement birds had to be reared, protein-rich foods became more freely available. The improvement in food supplies, coupled with excellent climatic conditions, was responsible for a very successful rearing season.

EGG PRODUCTION.

It is gratifying to note that a decline of 6% in the production of eggs in the South Queensland Egg Marketing Board area recorded during the year was much less than that in 1951-52, when production declined very sharply by 21%.

There appears to be some revival of interest in the raising of poultry by farmers in Central Queensland. However, the decline in commercial production as measured by the intake of the Central Queensland Egg Marketing Board is approximately 33%.

From estimates supplied by the Branch Adviser in North Queensland, it would appear that the decline in production noted over the past two years has been arrested in that portion of the State.

POULTRY MEAT PRODUCTION.

Although there was some recovery in the value of poultry meats as compared with the closing stage of the previous year, it has apparently not been sufficient, with the increased costs of foodstuffs, to induce farmers to give much additional attention to this aspect of poultry raising. Either this, or poultry raisers have lost confidence in the stability of this side of the industry. At the closing stages of the previous year, henflesh was reduced to 1s. 4d. and cockerels to 1s. 9d. per lb. liveweight. They advanced to as much as 1s. 10d. and 2s. 6d. respectively, but at the close of this year they have again fallen to 1s. 7d. and 2s. 2d.

Table 1 gives details of the slaughter of cockerels and hens for the years 1951 to 1953.

TABLE 1.

SLAUGHTERINGS IN BRISBANE AREA.

(Source—Brisbane Poultry Abattoirs.)

Year.	Chickens (Cockerels).	Boilers (Hens).
1950–51	483,876	556,493
1951–52	574,886	637,372
1952–53	206,101	328,315

It will be seen from the table that the main source of poultry meat is henflesh, which is generally only available when the farmer considers a hen has outlived its purpose as an egg producer. Much of the decline in the slaughter of hens during the year is due to the fact that farmers found it necessary to dispose of excess numbers in the previous year due to feed shortages. Young females that have not commenced laying are sold as chickens. Last year many pullets had to be disposed of prior to laying, which increased the numbers slaughtered as chickens. Had these birds been retained for egg production, many would have been slaughtered as boilers during the present year.

POULTRY STOCK SUPPLIERS.

Since 1947, when registration of Stock Suppliers was introduced under the Poultry Industry Act, no less than 498 persons have been registered, but of these only 197 are now actively engaged in the business for which registration was made. This is the lowest number of registrations that have been made for some years. The decline in registrations can be attributed to some extent to the lower demand for chickens, which, no doubt, was responsible for the closure of small, uneconomic hatchery units. In order to meet the annual demand for chickens, it appears that those remaining in this class of business have had to increase the size of their flocks. During the year 1947 the average flock size of Stock Suppliers was 1,077 birds, whereas in 1953 it was 1,266.

A marked change has occurred since 1947 in the breeds of poultry kept by Stock Suppliers. This change could be attributed partly to the desire by the farmers to produce a carcase of a higher value for table purposes, partly to the use of a breed producing brown-shelled eggs with the object of avoiding some egg cleaning, and partly to the increased demand for crossbred fowls for egg production.

Table 2 shows the number of fowls blood-tested for Stock Suppliers for the years ending 1947 and 1953 and the percentage of different breeds.

TABLE 2.

BREED COMPOSITION OF TESTED STOCK SUPPLIERS' FOWLS.

—	1947.	1953.
Number of fowls tested ..	196,252	198,804
	%	%
White Leghorns	47	26
Australorps	48	66
Rhode Island Reds ..	3	4
Other breeds..	2	4

(*Note.*—Other breeds during 1953 included crossbred fowls which were not in evidence in 1947 on the farms of Stock Suppliers.)

It is pleasing to be able to report a marked lessening in the incidence of pullorum disease in flocks of Stock Suppliers. Table 3 gives the percentage found in the various breeds in 1947 and 1953.

TABLE 3.

PERCENTAGE INCIDENCE OF PULLORUM DISEASE.

—	1947.	1953.
	%	%
White Leghorns	3·1	1·2
Australorps	5·3	0·93
Rhode Island Reds ..	6·8	0·72
Other breeds..	2·6	1·1

CHICK SEXING.

Twenty-seven persons were licensed for determining the sex of day-old chickens. For the years 1949 to 1952, the numbers of chickens sexed are as set out in Table 4.

TABLE 4.

NUMBER OF CHICKENS SEXED.

1949.	1950.	1951.	1952.
2,178,503	2,381,100	2,411,621	1,921,276

From the table it will be noted that there is rather a steep decline in the number of chickens sexed during the hatching season of 1952. The demand for early-hatched chickens for the calendar year 1952 was poor; this, no doubt, accounts for the fall in numbers of chickens sexed, and the lowered output of chickens during this period could be partly responsible for the shortage of eggs that has occurred during the latter part of the year under review.

POULTRY ADVISORY BOARD.

This Board, on which the Branch is represented, met on two occasions. The business dealt with included consideration of the Estimates of the Branch, precepts to be issued on Egg Marketing Boards, grants to organisations for poultry research work, regulations relating to standards for prepared poultry foods, and the Branch's own programme of experimental work.

EXPERIMENTAL WORK.

Antibiotic Feeding.

During the year under review, penicillin was marketed as an antibiotic feeding supplement for inclusion in chick-starter mashes. Whilst a considerable amount of research had been carried out overseas on the effects of various antibiotics, the results reported have been extremely variable. The amounts of antibiotics found to produce the best effects also varied considerably.

It was decided to investigate the effects of various amounts of penicillin added to chick-starter mashes on the growth rates of cockerel chickens from day-old to 10 weeks of age.

A batch of 240 day-old Australorp cockerel chickens was divided into five groups of 48 chickens per group and each group was further subdivided into six smaller groups for the purpose of obtaining mean group weights. The chicks were weighed fortnightly until 10 weeks of age. Food consumption was also computed on a fortnightly basis.

A starter mash composed of maizemeal (25 lb.), wheatmeal (25 lb.), bran (15 lb.), pollard (17 lb.), meatmeal (15 lb.), lucerne meal (2 lb.), common salt (1 lb.) and supplemented with synthetic riboflavin, manganese sulphate and vitaminised fish oil supplying vitamins A and D3 was fed to all five groups throughout the period of the experiment. Increasing amounts of potassium penicillin were added to the rations fed to four of these groups at the rate of 3 g., 9 g., 15 g. and 21 g. to the short ton respectively.

Table 5 sets out the results obtained from this experiment.

TABLE 5.

RESULTS OF FEEDING POTASSIUM PENICILLIN IN CHICK STARTER.

—	Group 1.	Group 2.	Group 3.	Group 4.	Group 5.
Mean weight in oz. at—					
Day-old	1·37	1·35	1·37	1·31	1·37
2 weeks	4·06	4·33	4·85	4·79	4·92
4 weeks	9·81	9·33	10·73	10·85	10·79
6 weeks	16·70	16·46	19·00	18·06	17·49
8 weeks	27·44	27·80	30·36	29·54	29·12
10 weeks	39·69	39·68	43·83	41·33	42·44
Feed/Gain Ratio	3·01	3·08	2·98	3·05	2·91
Weight increases expressed as percentages of mean control weight at—					
2 weeks	7	19	18	21	
4 weeks	−5	9	11	10	
6 weeks	−2	14	8	5	
8 weeks	1	11	8	6	
10 weeks	0	10	4	7	

The experimental groups as set out in Table 5 are to be interpreted as follows—Group 1 (Control); Group 2 (Control + 3 g. penicillin/short ton); Group 3 (Control + 9 g. penicillin/short ton); Group 4 (Control + 15 g. penicillin/short ton); Group 5 Control + 21 g. penicillin/short ton).

The results from this experiment showed that the addition of the various levels of potassium penicillin produced weight increases within the first two weeks of life. When these weight increases are expressed as percentages of the mean weights of chickens fed the Control ration, the bigger proportional weight increases are obtained during this period. As the birds mature, the rate of gain in weight due to feeding of antibiotic decreases.

It would appear also, under the conditions of this experiment, that there is no advantage in adding potassium penicillin to chick-starter rations in excess of 9 grams to the short ton.

Condensed Whale Solubles.

Further work on the desirability of condensed whale solubles (CWS) as a source of animal protein in poultry feeding was carried out during 1952.

In the first experiment, condensed whale solubles were used as a full and also as a partial replacement for meatmeal in a chick-starter ration with a total crude protein value of 19%. The CWS used in this experiment had a protein content of 53%, which was approximately equal to that of the brand of meatmeal used.

The four rations used in this experiment and the results obtained are set out in Table 6.

TABLE 6.

CWS FEEDING EXPERIMENT—No. 1.

—	Experimental Group No.			
	R1A. (Control).	R2A.	R3A.	R4A.
	Lb.	Lb.	Lb.	Lb.
Ration Ingredient—				
Wheatmeal	40	40	40	40
Bran	15	15	15	15
Pollard	26	26	26	26
Meatmeal	16	8	4	Nil
CWS (53%)	Nil	8	12	16
Bone meal	2½	2½	2½	2½
Salt premix*	½	½	½	½
Vitaminised A and D_3 preparation	Fl. Oz. 2	Fl. Oz. 2	Fl. Oz. 2	Fl. Oz. 2
	Oz.	Oz.	Oz.	Oz.
Results of feeding—				
Average weight at 1 week	1·9	1·9	1·9	1·9
Average weight at 7 weeks	23·0	19·2	17·0	14·0
Average gain in weight	21·1	17·3	15·1	12·1
*Birds affected with dermatosis at 7 weeks	..	42%	48%	75%

* Every ½ lb. common salt contained 16 g. manganese sulphate and 160 mg. synthetic riboflavin.

All chickens were fed a ration containing protein of vegetable origin for the first week so as to bring about a partial depletion of any vitamin B12 carryover from the parent birds. At the end of the first week the chicks were individually weighed and four experimental groups (Control, R2A, R3A, and R4A) were set up, every precaution being taken to ensure proper randomisation of the various class weights. The chickens were individually weighed at five and seven weeks of age. Feeding of the four experimental rations began at one week of age and continued for six weeks.

During the course of the experiment, it was noted that a form of dermatosis was appearing on the soles of the feet of those chickens fed rations in which meatmeal had been replaced partly or wholly by condensed whale solubles. In the early stages the feet became dry and callused, and as the experiment progressed, blood-stained fissures appeared. In some birds the feet were so badly affected that they had great difficulty in walking on the wire floors of the rearing cages. From the results it will also be seen that growth was poorer as the amount of CWS in the ration increased.

As the condensed whale solubles used in the first experiment had been stored for over 18 months, it was thought that some deterioration might have taken place and been responsible for the poor growth and the presence of dermatosis. Therefore it was deemed desirable to repeat the first experiment using CWS of a later date of manufacture.

Because the protein content of this batch of CWS was lower than that used in the first experiment, the experimental rations had, of necessity, to be modified. In addition, 4% livermeal was included in one ration to see whether livermeal supplied those factors in which CWS seemed to be lacking.

A similar number of day-old chickens was used and subjected to a depletion diet for the first week, followed by the differential feeding of the experimental rations to seven weeks of age. All four rations contained approximately 18% crude protein.

The rations used in this experiment and the results obtained are set out in Table 7.

TABLE 7.

CWS Feeding Experiment—No. 2.

—	Experimental Group No.			
	Control.	R2B.	R3B.	R4B.
	Lb.	Lb.	Lb.	Lb.
Ration Ingredient—				
Wheatmeal ..	41	38	38	36
Bran	15	15	15	15
Pollard ..	26	26	26	26
Meatmeal ..	15	4	Nil	Nil
CWS (44%) ..	Nil	14	14	20
Livermeal ..	Nil	Nil	4	Nil
Bone meal ..	2½	2½	2½	2½
Salt premix* ..	½	½	½	½
Vitaminised A and D_3 preparation ..	Fl. Oz. 2	Fl. Oz. 2	Fl. Oz. 2	Fl. Oz. 2
Results of feeding	Oz.	Oz.	Oz.	Oz.
Average weight at 1 week ..	1·7	1·7	1·7	1·7
Average weight at 7 weeks ..	20·8	18·1	22·4	15·4
Average gain in weight ..	19·1	16·4	20·7	13·7
Birds affected with dermatosis at 7 weeks ..	Nil	20%	Nil	51%

* Every ½ lb. common salt contained 16 g. manganese sulphate and 160 mg. synthetic riboflavin.

The results from this test confirmed the findings of the previous test of poor growth and dermatosis when CWS was used as a full or partial replacement for meatmeal.

The addition of 4% livermeal to a ration containing CWS produced significantly better growth than that obtained on all other rations, including the control ration based on meatmeal, and no evidence of dermatosis was found in chicks fed this combination.

From these experiments it may be said that CWS will not replace meatmeal pound for pound in chick rations.

However, CWS can be used in chick-starter mashes provided a rich vitamin B-complex feed such as livermeal is included in the ration.

Breed Production.

This experiment was designed to assess the egg production, feed utilisation and flesh qualities of the White Leghorn × Australorp cross in comparison with the pure breeds from which this cross is derived.

The three classes of stock for this experiment, which commenced towards the end of July, 1952, at Kairi Regional Experiment Station, were obtained from a commercial hatchery in Brisbane where the two pure breeds had been maintained as closed flocks for a considerable time. The crossmating of these pure breeds therefore provided hybrid chickens related in some degree to the purebred progeny derived from matings within each breed.

A total of 211 Australorps, 210 White Leghorns and 195 Crossbred day-old pullets was brooded for one month and then transferred to the weaning pens, where the birds remained until four months of age, at which time they were moved to their permanent laying quarters.

Average weights for each breed at day-old, 4 weeks and 18 weeks were recorded, togther with food consumption and rearing losses. The information is set out in Table 8.

The cost of rearing per bird from day-old to 18 weeks, taking into account the purchase price of the chickens, cost of feed, medicaments and brooding, but excluding labour costs, was determined for each breed and is shown in the table.

TABLE 8.

Results of Breed Production Experiment to 18 Weeks.

—	White Leghorns.	Cross-breds.	Aus-tralorps.
	Oz.	Oz.	Oz.
Average weight at day-old..	1·33	1·16	1·24
Average weight at 4 weeks..	10·26	9·35	8·76
	Lb.	Lb.	Lb.
Average weight at 18 weeks	3·86	4·06	4·45
Food consumed per bird from day-old to 18 weeks	17·3	17·7	18·0
Cost of rearing per bird ..	7s. 11d.	8s. 1·6d.	8s. 6d.
Deaths—First 4 weeks ..	2%	4·6%	10%

The laying test was deemed to have begun when the first egg was laid by any of the breeds. After culling obviously unthrifty birds, the numbers remaining in each group were White Leghorns 186, Crossbreds 180, and Australorps 174.

The birds in each of the three groups were randomised equally among six pens to give approximately 30 birds to a pen, so a total of 18 laying pens is now under test.

This test is in its twenty-fourth week, and although data so far obtained would indicate the present superiority of the Crossbred as an egg-producer under the conditions of this experiment, there are a further 28 weeks to go before the completion of one year's production. From Table 9 it will be noted that the production, feed utilisation and low wastage due to losses definitely favour the crossbred pullet.

TABLE 9.

Results of Breed Production Experiment to 24 Weeks.

—	White Leghorns.	Crossbreds.	Australorps.
Number of pullets penned	186	180	174
Number of deaths ..	16	7	9
Deaths due to cannibalism ..	10	1	0
Hen housed production per bird ..	Eggs. 71·7	Eggs. 86·5	Eggs. 78·3
Feed to produce 1 dozen eggs ..	Lb. 6·73	Lb. 5·88	Lb. 6·60
Average per cent. production 8 weeks after first egg ..	53·6	57·0	52·9

Figure 1 shows the trend in production in these three groups of birds for 24 weeks since commencement of lay.

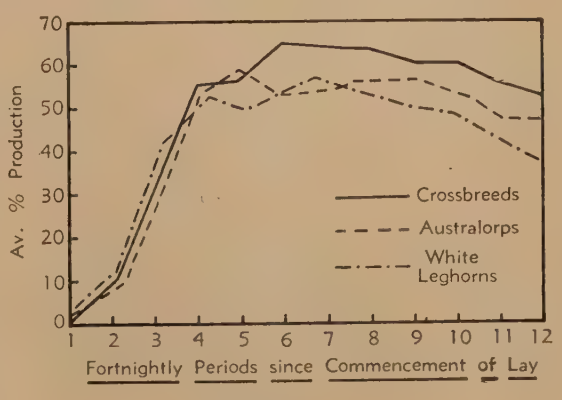


Fig. 1.

Production Trends Based on the Average Percentage Production Per Breed Per Fortnight.

DISEASE AND PEST CONTROL.

Officers in the field have investigated 629 outbreaks of disease in poultry. Predominant among these was the disease known as leucosis, followed by coccidiosis and vitamin A deficiency. Coryza and diseases of a respiratory nature have been prevalent, as has fowl pox in certain areas of the State. Many of these diseases are aggravated by insanitary conditions, poor nutrition and overcrowding.

Leucosis.

From overseas work it appears that this disease can be controlled to a degree by rearing chickens in strict isolation. This practice presents difficulties on many one-man farms because of their layout. Efforts are being made to induce farmers to use aged birds for breeding purposes in the belief that they produce stock with some added resistance to the disease; and also to arrange their farms to permit the raising of chickens in some degree of isolation.

Coccidiosis.

Nitrofurazone, a drug used for the prevention of coccidiosis, is available for the first time in Queensland. This drug has given some degree of protection overseas but it remains to be seen how effective it will be under Queensland conditions. It is rather unfortunate that there is a tendency on the part of poultry raisers, when drugs become available for the prevention and treatment of disease, to depart somewhat from sound husbandry practices.

Vitamin A.

This is the most frequent vitamin deficiency encountered in Queensland. It is not confined to any one period of the year, although the number of cases reported to this Branch is higher during the summer. Indirectly this deficiency is caused by the farmer's failure to appreciate the value of succulent green feeds rich in vitamin A or in their absence the use of such vitamin A-rich supplements as fish oils and emulsions.

It is becoming increasingly evident that some of the losses in very young chickens which are not due to bacterial agents or faulty brooding are linked with the low level of vitamin A in the ration fed to the breeding hens.

Respiratory Diseases.

Respiratory diseases have been very prevalent, the most common reported being coryza. In many of the severe outbreaks investigated, it was found that the respiratory infections were complicated by probable borderline vitamin A deficiencies.

Perhaps the commonest predisposing causes of respiratory troubles as observed on farms where outbreaks have occurred are overcrowding and poor ventilation.

Treatment with sulpha drugs in cases where the morbidity was high was tried but was not always successful.

Fowl Pox.

Fowl pox has been prevalent over some years in some areas, and although not generally responsible for heavy mortality, it has adversely affected egg supplies, particularly during the winter months.

During the year the officer stationed in the Townsville area made a drive to encourage vaccination of poultry flocks, using a fowl pox vaccine manufactured by the Commonwealth Serum Laboratories. It is pleasing to be able to report that in this area the incidence of fowl pox has been particularly low and outbreaks have only occurred in flocks that were not vaccinated.

Pullorum Disease.

Officers of the Branch have tested almost the same number of birds as in the previous year. Table 10 gives the number of birds tested in different districts. It will be noted that a new district has been made at Caboolture since the stationing of an officer in that centre. The blood testing in that area was formerly conducted from Brisbane.

Table 10.

PULLORUM TESTING.

District.	1951–52	1952–53.
	No. Tested	No. Tested
Toowoomba	31,207	31,824
Ipswich	4,784	6,783
Brisbane	163,322	130,033
Caboolture	..	33,210
Bundaberg	14,055	12,641
Rockhampton ..	3,028	2,848
Townsville	6,293	7,197
Atherton	10,638	10,633
Total	233,327	235,169

Stickfast Flea Control.

The outbreak that occurred in the Helidon area has been brought under control and the stickfast flea has not been found on any fowls or dogs on the one infested property in the area for the past six months.

In the Boonah area infestation has been further reduced, but owing to the widespread nature of the infestation and the movement of cats and dogs constant attention is essential to guard against fresh outbreaks.

EXTENSION WORK.

Over 4,000 visits were made by officers of the Branch to poultry raisers during the year in an advisory and inspectorial capacity and 64 public lectures were given. In addition to field work in this direction, quite a number of poultry raisers call on officers at their headquarters for advice. In the Brisbane Office well over a thousand such enquiries have been made.

In order to acquaint officers of the Branch of the latest trends and findings with regard to disease control, nutrition and husbandry, a poultry refresher course of one week's duration was held during the year. Part of the time was spent at the Animal Health Station, Yeerongpilly, where the veterinary staff discussed various poultry diseases and their methods of control. The opportunity was also taken whilst all members of the Branch were assembled to discuss recent amendments to the Poultry Industry Acts and regulations which had been issued under these Acts.

DIVISION OF DAIRYING.

FIELD SERVICES BRANCH.

Mr. R. A. Paul, Director of Field Services.

As shown in Figure 1, above-average falls of rain were experienced in five of the 12 months. However, with the exception of dry spells in late spring and early summer and May and June, the distribution was such that monthly production was above the average for the past 10 years except for December and January.

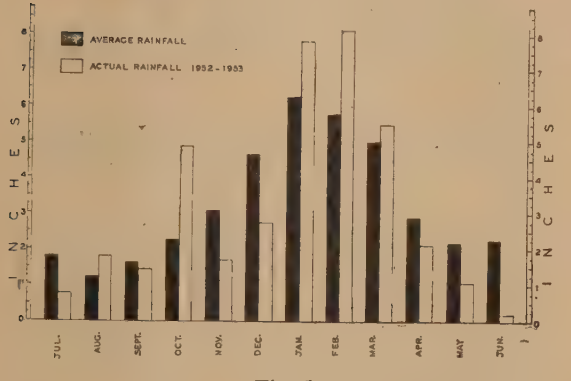


Fig. 1.

RAINFALL DURING 1952-53. THE COLUMNS GIVE A COMPOSITE PICTURE OF THE MONTHLY RAINFALL AT 10 IMPORTANT DAIRYING CENTRES.

Table 1 shows the recovery in production and in dairy cattle numbers after the drought year 1951-52.

TABLE 1.

SUMMARY OF PRODUCTION STATISTICS.

Year.	Dairy Cattle* (000).	Dairy Cows in Milk and Dry* (000).	Butter Production† (tons).	Cheese Production† (tons).	Total Milk Gallonage† (000,000).
1946–47..	1,332	891	33,078	7,720	207
1947–48..	1,382	923	46,454	9,641	273
1948–49..	1,423	930	47,187	9,410	277
1949–50..	1,433	927	48,197	9,170	281
1950–51..	1,440	928	47,402	8,674	278
1951–52..	1,296	823	27,850	4,700	180
1952–53..	1,373	872‡	49,425	9,439	286‡

* As at March 31. † For year ending June 30.
‡ Estimated.

BUTTER PRODUCTION.

Amount.

The production of butter for the year was 49,425 tons, being a very appreciable increase over the previous year and comparable with that of the preceding four years.

The trend of butter production over the past seven years is shown in Figure 2. With the exception of the two drought years 1946-47 and 1951-52, production has remained relatively constant during the period.

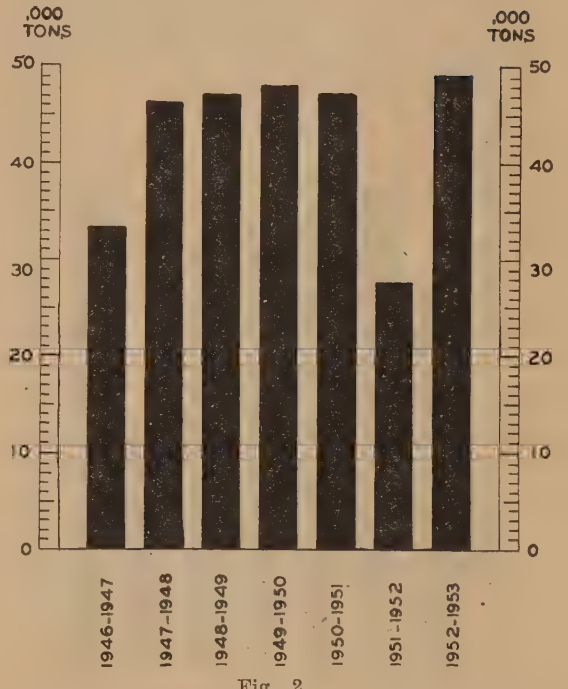


Fig. 2.

QUEENSLAND BUTTER PRODUCTION, 1946-47 TO 1952-53.

Quality.

The official gradings for the year shown in Table 2 reveal an increase in choice quality as compared with the previous two years. This improvement is very pleasing and reflects credit on factory directorates and managements for their policy of installing modern equipment; also on the officers of this Department, who have always been anxious to assist in quality improvement on the farm and in the factory.

TABLE 2.

OFFICIAL GRADINGS OF BUTTER.

Grade.	1950–51.	1951–52.	1952–53.
	%	%	%
Choice	39·49	32·45	46·96
First	54·79	60·03	46·75
Second and Pastry	5·72	7·52	6·29
Percentage of butter graded ..	79·50	61·90	80·30

Under the Commonwealth Government's guaranteed prices plan, costs of production were accepted as

Farm costs 460s. 0.48d. per cwt.

Factory costs 43s. 5.14d. per cwt.

The Commonwealth agreed to pay subsidy on all butter consumed on the Australian market and on an amount of export butter equivalent to 20% of that used locally. The expected return from local sales is 403s. per cwt., involving the Commonwealth Government in a subsidy payment of 100s. 6d.; whilst the expected net return from export sales is 390s. per cwt., involving a subsidy payment of 113s. 6d. per cwt. for that portion qualifying for subsidy.

In general farmers are receiving an interim price of 3s. 10½d. per lb. commercial butter, equivalent to 4s. 8.7d. per lb. of butterfat.

Factory Buildings and Equipment.

Factory buildings generally are in good condition, whilst every effort is being made to replace older equipment with up-to-date machinery. During the year one factory installed a tandem vacreator to replace a volatiliser, one factory converted a single-unit vacreator to a triple unit, and one a single unit to a tandem unit. Other equipment installed included 6 churns and 1 barrel, 10 holding vats, 5 enclosed-plate-type coolers, 2 sets stainless steel pipelines, 7 metal butter packers, 2 can washers, 3 sets of roller conveyors, 2 sets of roller driers to handle buttermilk, 2 condenser towers, and 1 cold water tank.

CHEESE PRODUCTION.

Amount.

The production of cheese amounted to 9,439 tons, this being approximately double the production for 1951-52.

Figure 3 shows the trend of production over the past seven years. It will be seen that the picture is very similar to that for butter production. Little significant movement is shown except for the two drought years 1946-47 and 1951-52.

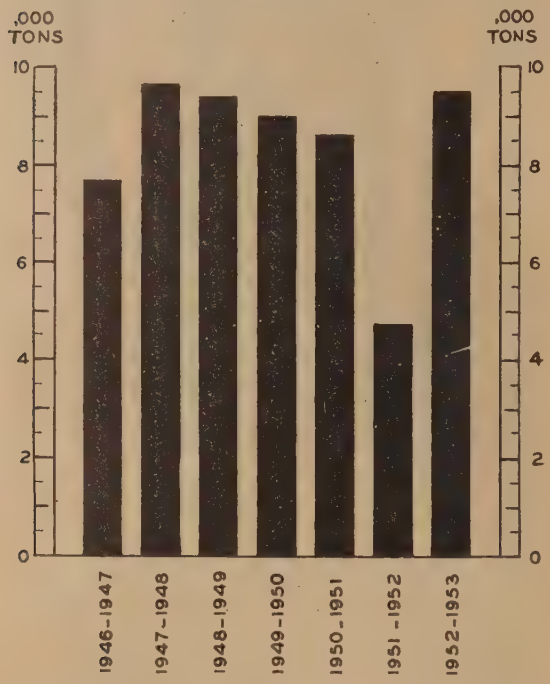


Fig. 3.

QUEENSLAND CHEESE PRODUCTION, 1946-47 TO 1952-53.

Quality.

The quality of cheese during the year was significantly better than in the previous few years. The results of official gradings are shown in Table 3. In point of fact, the percentage of choice and first quality cheese is the highest ever graded in Queensland. The previous best was in the year 1949-50, when 79.8% was graded into these qualities. This position is highly satisfactory and credit is due to factory operatives who have taken greater interest in starter control particularly, and in manufacturing techniques generally; also to Departmental officers, who have been untiring in their efforts to improve the quality of milk delivered to the factories.

TABLE 3.

OFFICIAL GRADINGS OF CHEESE.

Grade.	1950–51.	1951–52.	1952–53.
	%	%	%
Choice and First	70·34	68·26	86·3
Second	28·43	30·64	13·2
Third	1·23	1·10	·5
Percentage of cheese graded ..	51·50	38·50	61·5

Under the guaranteed prices plan, costs are recognised as shown:—

Farm costs 237s. 0.62d. per cwt.

Factory costs 40s. 9.66d. per cwt.

This means that farmers are receiving an interim price of approximately 5s. per lb. butterfat.

Factories and Equipment.

Satisfactory progress has been made during the year with improvements to premises and equipment. The use of plate-type pasteurisers is increasing, and several stainless steel making vats have been installed to replace old tinned-plate equipment. Repairs to floors have been carried out where required. The tendency is for the smaller factories in Associations to close, and their supply to be absorbed into larger factories, with a subsequent saving in costs.

MARKET MILK PRODUCTION.

Milk production was maintained at a high level throughout the year and the cheese and butter factories which supplied milk to the Brisbane market during last year's drought period have continued to supply that market on the quota system. Country factories supplied 62% of the milk coming to the Brisbane wholesalers, the balance of 38% being forwarded direct by producers. With the exception of less than 1,000 gallons per day from one factory, all milk from country factories is now being conveyed to wholesalers by modern milk tankers. The quality of milk generally has shown an improvement, but low butterfat testing milk has caused some concern during the period July to October, particularly where morning's milk only is supplied. Some producers were suspended temporarily from supplying milk because of low bacteriological quality and low butterfat content, and this had the effect of improving the overall standard.

A survey carried out by an officer of the Milk Board during the year showed that at April 1, 1953, 29% of the direct suppliers to the Brisbane wholesalers had installed mechanical refrigeration units, and that such suppliers were delivering 50% of the milk received from direct suppliers. This is a fairly satisfactory position and is indicative of the greater care being exercised by the wholemilk supplier in order to produce an article of top quality.

During the year there was a complete changeover to square milk bottles by all metropolitan milk wholesalers and these are now the standard in the city area for one pint and one-third pint containers.

The new milk factory and plant at Rockhampton came into full operation and generally there has been a steady improvement in the standard of equipment at the milk factories.

The Government subsidised School Milk Scheme commenced operation in the Greater Brisbane area early in April and is working smoothly. The scheme since then has been extended to six approxed country areas —Warwick, Southport, Nambour, Maryborough, Townsville and Innisfail.

Table 4 shows the milk consumption figures for the Brisbane area for the past few years.

TABLE 4.

MILK CONSUMPTION IN BRISBANE.

Year.	Consumption (Million Gallons).
1946–47	10·9
1947–48	11·2
1948–49	11·9
1949–50	12·5
1950–51	13·6
1951–52	14·0
1952–53	14·4

The price paid to producers forwarding wholemilk to the metropolitan area was 3s. per gallon during the summer-price period, this being equivalent to 7s. 7.8d. per lb. of butterfat calculated on the average fat percentage of 3.8, and 3s. 4d. per gallon during the winter-price period, equivalent to 8s. 6d. per lb. butterfat.

MILK DRYING AND CONCENTRATING.

The installation of milk-drying equipment has increased. Roller driers are now installed at Beaudesert, Southport, Toowoomba and Kingston for drying skim-milk, while Pauls Ice Cream and Milk Co. have almost completed the installation of spray drying equipment in their new factory at Brisbane. The South Coast Co-operative Dairy Association, Southport, also supplies quantities of roller-dried wholemilk for ice-cream manufacture. Some skim-milk powder and buttermilk powder was exported during the year.

Nestles' modern milk products factory at Gympie is nearing completion and is expected to commence manufacture shortly.

MARGARINE PRODUCTION.

The price increase for butter has created a greater demand for table margarine and as a result the overall quota for the manufacture of table margarine was substantially increased.

Table 5 gives the quantity of table margarine manufactured and the quota for the past six years.

TABLE 5.
QUANTITY OF TABLE MARGARINE MANUFACTURED.

Year.	Manufacture	Quota.
	Tons.	Tons.
1947–48	667	645
1948–49	646	645
1949–50	659	645
1950–51	438	645
1951–52	784	1,600
1952–53	913	6,860

General improvements in the standard of building and equipment for the purposes of manufacturing table margarine have been maintained. One new modern factory is nearing completion, another has been planned for early construction, and two smaller manufacturers have acquired land for rebuilding purposes. The installation of modern equipment and improved standard of buildings, together with adequate technological control, appear to be the general trend in this field.

HERD IMPROVEMENT SERVICE.

The demands for both Pure Bred and Group Herd Production Recording increased, due to the favourable seasonal conditions.

Pure Bred Production Recording.

During the year 118 herds were recorded as against 112 in 1951-52.

Table 6 shows the number of cows recorded under the Pure Bred Scheme which completed lactations of 273 days or less during the past six years, together with the average production of those cows.

TABLE 6.
SUMMARY OF PURE BRED PRODUCTION RECORDING.

Year.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		Lb.	%	Lb.
1947–48 ..	621	6,981	4·67	326
1948–49 ..	1,064	6,783	4·76	323
1949–50 ..	1,064	6,608	4·68	310
1950–51 ..	1,153	5,917	4·5	271
1951–52 ..	885	5,571	4·65	259
1952–53 ..	984	6,247	4·6	290

The numbers of cows of each breed which were submitted to test are shown in Table 7, together with the numbers and percentages which passed or failed to reach the standard age-production and the number of cows withdrawn.

TABLE 7.
RESULTS OF PURE BRED COWS TESTED, ACCORDING TO BREED

Breed.	—	Total.	Passed.	Failed.	With-drawn.
A.I.S. ..	No.	359	186	142	31
	%	..	51·8	39·6	8·6
Ayrshire	No.	47	34	9	4
	%	..	72·3	19·2	8·5
Friesian	No.	9	3	6	..
	%	..	33·3	66·7	..
Guernsey	No.	65	28	36	1
	%	..	43·1	55·4	1·5
Jersey ..	No.	602	309	226	67
	%	..	51·3	37·6	11·1
Red Poll	No.	5	..	5	..
	%	..	..	100	..
Total	No.	1,087	560	424	103
	%	..	51·5	39·0	9·5

It will be seen from the table that a total of 560 cows (51.5%) reached the required age-production standard, compared with 377 (32.0%) in 1951-52.

Table 8 shows the average production, according to breed and age groups, of cows which completed lactation periods of 273 days or less.

TABLE 8.
RESULTS OF PURE BRED COWS, IN AGE GROUPS AND BREEDS, WHICH COMPLETED LACTATIONS OF 273 DAYS OR LESS.

Breed.		J.2.	S.2.	J.3.	S.3.	J.4.	S.4.	Mature.	All Ages.
A.I.S.	No. of Cows. ..	82	52	38	39	21	15	81	328
	Milk (lb.)	6,258	6,632	7,139	7,495	7,193	7,940	8,540	7,267
	Butterfat (lb.) ..	249	261	291	285	285	331	336	288
	Test (%)	4·0	3·9	4·1	3·8	4·0	4·1	3·9	3·9
Ayrshire	No. of Cows ..	15	9	9	..	1	..	9	43
	Milk (lb.)	6,934	6,620	6,297	..	16,466	..	9,541	7,504
	Butterfat (lb.) ..	284	276	270	..	765	..	427	320
	Test (%)	4·1	4·2	4·3	..	4·6	..	4·5	4·3
Friesian	No. of Cows ..	..	3	..	2	1	1	2	9
	Milk (lb.)	..	5,109	..	6,377	3,288	3,744	11,468	6,450
	Butterfat (lb.) ..	..	180	..	439	110	141	381	221
	Test (%)	..	3·5	..	3·4	3·3	3·8	3·3	3·4
Guernsey	No. of Cows ..	20	7	6	5	6	7	13	64
	Milk (lb.)	4,828	5,674	5,214	5,428	6,105	6,877	6,174	5,926
	Butterfat (lb.) ..	228	282	247	247	283	327	298	277
	Test (%)	4·7	5·0	4·7	4·6	4·6	4·7	4·8	4·7
Jersey	No. of Cows ..	145	58	81	52	28	31	140	535
	Milk (lb.)	4,574	5,098	5,244	6,222	6,125	5,919	6,643	5,593
	Butterfat (lb.) ..	238	260	281	329	327	309	347	293
	Test (%)	5·2	5·1	5·4	5·3	5·3	5·2	5·2	5·2
Red Poll	No. of Cows ..	1	2	..	..	..	..	2	5
	Milk (lb.)	2,184	2,622	..	..	..	..	2,061	2,310
	Butterfat (lb.) ..	73	68	..	..	..	..	68	69
	Test (%)	3·3	2·6	..	..	..	..	3·3	3·0

All ages and all breeds :—No. of Cows, 984 ; Milk, 6,247 lb. ; Butterfat, 290 lb. ; Test, 4·63%.

During the year the third annual report on Pure Bred Production Recording was published in the *Queensland Agricultural Journal* in place of the usual supplement to the Journal.

Register of Merit.

The publication of the initial Register of Merit for Dairy Cattle aroused considerable interest, and influenced farmers in the realisation that the assessment of an animal's worth on a lifetime production basis is more reliable than one lactation record only.

Table 9 shows the number and breed of cows and sires which have qualified for entry into the Register.

TABLE 9.
SUMMARY OF COWS IN REGISTER OF MERIT.

Section.	A.I.S.	Ayr-shire.	Friesian.	Guernsey	Jersey.	Total.
Inter-mediate	22	1	..	2	63	88
Lifetime ..	8	..	1	1	12	22
Elite ..	2	..	..	..	1	3

Sires Register of Merit.—A.I.S., 1; Jersey, 2.

Group Herd Recording Scheme.

At the commencement of the year there were 45 groups in operation, but the membership of many of them was well below strength due to the drought experienced in the previous year. It was not possible to rebuild two groups, and they were amalgamated with others, whilst an additional seven new groups were formed, bringing the total number to 50. Interest in the scheme has been well sustained and further groups are expected to operate in the coming year.

The latest period for which complete figures are available is the year ended September 30, 1952, when 45 groups had been operating sufficiently long to have cows complete lactations. A total of 23,123 cows in 818 herds completed lactation, with an average of 112 lb. butterfat, compared with 146 lb. butterfat for the previous year. This low figure is the result of the prolonged drought, which did not break until March 1952.

Table 10 gives the numbers of cows and their production according to age groups.

TABLE 10.

NUMBERS AND AVERAGE PRODUCTION OF GROUP COWS ACCORDING TO AGE.

Age-Group.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		lb.	%	lb.
2 years	2,554	2,334	4·3	101
3 years	2,135	2,449	4·3	106
4 years	1,788	2,561	4·3	111
Mature	6,948	2,780	4·2	117
Unknown	9,698	2,718	4·2	113
Total	23,123	2,657	4·2	112

The average length of lactation was 209 days.

The effect which the length of lactation has on production is apparent from Tables 11 and 12. The former shows the average production per cow, according to age, of cows which milked for the full lactation period of 270 days, whilst the latter gives similar information for cows which completed lactation periods of less than 270 days.

As the table shows, the average production of cows which completed a lactation of 270 days was 149 lb. butterfat, compared with 93 lb. for cows which completed lactations of less than 270 days, an increase of 56 lb. (60%).

These figures emphasise the necessity for providing sufficient fodder to enable the cows to milk a full lactation period.

TABLE 11.

AVERAGE PRODUCTION, ACCORDING TO AGE, OF GROUP COWS WITH A 270 DAYS LACTATION.

Age Group.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		Lb.	%	Lb.
2 years	959	3,168	4·4	138
3 years	884	3,039	4·4	134
4 years	429	3,237	4·5	144
Mature	2,448	3,561	4·3	153
Unknown	2,954	3,697	4·2	156
Totals	7,874	3,479	4·3	149

TABLE 12.

AVERAGE PRODUCTION, ACCORDING TO AGE, OF GROUP COWS WITH A LACTATION PERIOD LESS THAN 270 DAYS.

Age Group.	No. of Cows.	Average Production per Cow.		
		Milk.	Test.	Butterfat.
		Lb.	%	Lb.
2 years	1,595	1,832	4·3	79
3 years	1,251	2,032	4·3	86
4 years	1,159	2,194	4·2	92
Mature	4,500	2,356	4·1	97
Unknown	6,774	2,290	4·1	95
Total	15,249	2,233	4·2	93

The effects of drought during the group herd recording year were felt most severely in the South Burnett, South-eastern Queensland and the Eastern and Western Downs districts, where average production per cow dropped by an average of 27% compared with the previous year, a little less severely in the Central and Upper Burnett districts, where an average decrease of 19% was recorded, and least of all in the Port Curtis, Mackay and Atherton districts, where the average fall in production was 12%.

The average production per cow in various major districts is shown in Table 13.

TABLE 13.

AVERAGE PRODUCTION ACCORDING TO DISTRICT.

District.	Herds.	Cows.	Average Production.		
			Milk.	Test.	Butterfat.
			Lb.	%	Lb.
Atherton Tableland	89	2,569	3,641	4·1	150
Mackay District ..	19	493	2,046	4·6	95
Port Curtis ..	14	173	2,180	4·7	103
Upper Burnett ..	22	673	3,159	4·0	127
Central Burnett ..	42	844	2,379	4·4	105
South Burnett ..	104	2,769	2,286	4·0	93
South Eastern Queensland ..	349	11,077	2,462	4·4	108
Eastern Downs ..	132	3,006	3,091	4·0	125
Western Downs ..	47	1,519	2,421	3·9	93

Surveys.

Data collected from the members of the Group Herd Recording Scheme has been analysed and collated with respect to

(*a*) Effect of month of calving on production.

(*b*) Effect of length of lactation on production.

(*c*) Production according to test.

A summary of the results is presented.

The effect of the month of calving on production has been surveyed for the period 1948-52 and shows that there are definite advantages to be gained by calving cows in the third quarter of the year. The trend in production according to the month of calving is depicted in Figure 4.

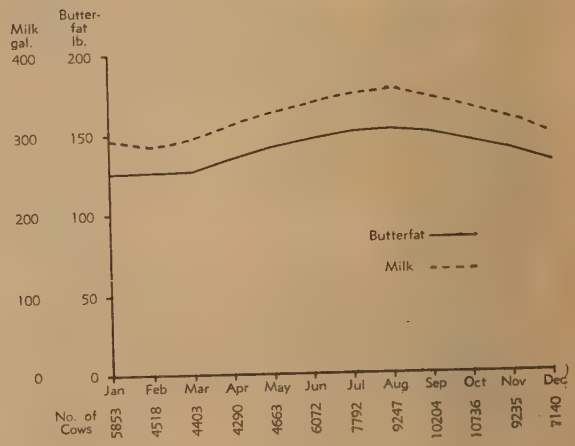


Fig. 4.

GRAPH SHOWING EFFECT OF MONTH OF CALVING ON PRODUCTION.

The effect of length of lactation on production shows that for the period 1948-52 only 30% of the cows milked for a period of 270 days, for an average production of 180 lb. butterfat, and 20% of the cows milked for less than six months, for an average production of 63 lb. butterfat. This stresses the need for better management of cows to enable them to milk for a full lactation period.

Production according to test.—There is a strong correlation between the butterfat content and the yield of butterfat. The trend of production according to test for all cows recorded in Queensland from 1948-52 is shown in Figure 5. Similar figures have been compiled for cows of the various breeds.

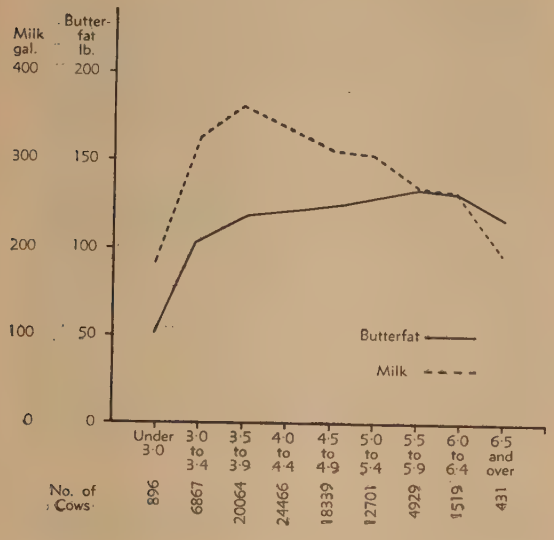


Fig. 5.

Graph Showing Relationship Between Butterfat, Test and Production (All Cows 1948-52).

Herd Wastage.

This survey has been continued, but due to the number of herds withdrawing from the scheme during, and for a time after, the drought, only a limited amount of data has been available. The main causes of wastage in order of importance are—low production, age, sterility, and udder troubles.

DAIRY INDUSTRY EFFICIENCY GRANT.

Due to rising costs, it was found necessary to curtail some of the activities financed from the Commonwealth Dairy Industry Efficiency Grant during the year, and one effect was that dairy farm competitions were discontinued. With increased interest in group herd recording, a greater proportion of the State allocation was spent on that project.

Other activities supervised by the Branch include—

(1) Development of demonstration farms and conduct of field days.

(2) Operation of a Mobile Film Unit.

(3) Cheese-milk cooling demonstrations.

(4) Subsidised interstate transport of herd sires.

Demonstration Farms.

The work has proceeded along similar lines to that outlined in last year's report, with a view to promoting efficiency and economic production, and results achieved during the year in regard to both increases in production and improved quality are shown in Figures 6 and 7.

Three demonstrators withdrew during the year, leaving 41 farms in the eight groups named in the figures; whilst the 11 single-unit farms which were operating in the previous year continued to do so.

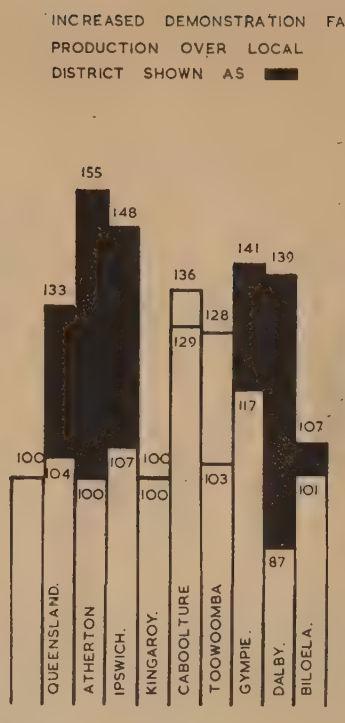


Fig. 6.

Comparison of Sales of Dairy Produce from Demonstration Farms and other Farms in Each Area. The First Column Represents the Average for 1948-49.

In order to assess the increase in production from the demonstration farms, a comparison has been made between the base year 1948-49 and the year under review (as has been done in previous reports) for such farms and for all other dairy farms in the group area.

Table 14 shows the comparison for the past four years for the State as a whole. The figures are very interesting and leave no doubt as to the benefit of the practices being adopted by the demonstrators to increase production.

TABLE 14.

Comparison of Level of Production on Demonstration Farms and Other Farms Compared with the Base Year 1948/49 as 100.

—	1949–50.	1950–51.	1951–52.	1952–53.
Demonstration Farms	103	103	80	133
All Farms	102	101	59	104

It will be seen that the greatest increases were achieved during the drought year 1951-52 and the year under review. This is explained by the fact that the programme designed for the farms has gradually been effected, and adequate provision made for paddock feed in the form of pastures and winter and summer grazing crops. As a result the demonstration farms are in a position to conserve fodder to a greater extent than most other farms.

Figure 6 shows the relative levels of production from the demonstration farms and other farms in the same area, compared with the production for the base year 1948-49. The black area shows the percentage increase in production on the demonstration farms.

The second column from the left shows that for all demonstration farms the production was 133% of the base year, whereas for all dairy farms in the State the production was 104% of the base year. These figures give a 28% increased production in favour of the demonstration farms.

All groups show an increase in production over the base year, but some of the districts are below this level. Particularly is this so with the Dalby district, where a number of dairy-farmers have changed over to beef and/or grain production.

Figure 7 compares the quality of the dairy produce delivered from demonstration farms with that of the respective districts.

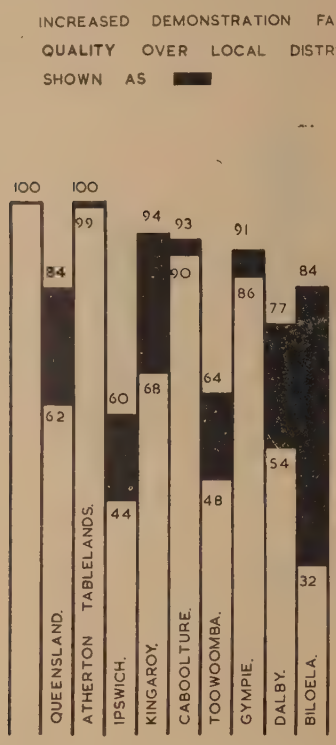


Fig. 7.

COMPARISON OF QUALITY OF DAIRY PRODUCE ON DEMONSTRATION FARMS AND OTHER FARMS IN 1952-53.

The value of modern milking methods, the use of strip cups, udder wash containers, approved detergents and sterilizers, and the installation of tower and charcoal coolers, is shown in the figures of improved quality from the demonstration farms.

In all groups, with the exception of the Atherton Tableland, significant increases in quality have been achieved, whilst for all demonstration farms 84% of production was graded as choice, whereas for all dairy farms only 62% was so graded. These figures indicate that if the approved methods to improve quality were generally adopted, an increase of 35% would be obtained on the present quantity of choice quality delivered to the various factories.

Field days were conducted on four of the demonstration farms and on 20 farms that were prizewinners in the 1951-52 Dairy Farm Competition. All of these functions were well attended by farmers, and reports received indicate very clearly that the practices being carried out on the demonstration farms, and on the leading farms in the different districts, are being adopted gradually by the dairy-farming community generally. Such gatherings are much appreciated by Departmental officers, as they are such a useful aid to the extension worker.

Film Unit.

The Unit completed itineraries in the Moreton, South Coast, Burnett and Maryborough-Bundaberg districts, screening at 115 centres to audiences totalling approximately 8,750 people.

Some useful additions have been made to the film library of films; these depict methods of silage-making and the breeding of better dairy cattle.

During the coming year it is intended to supplement the work of the film unit by arranging meetings and discussion groups at which will be used slides and film strips of items of local interest. By this method it is hoped to extend to a still wider circle of farmers the work in progress on the demonstration farms. Due to the illness of the operator, it was found necessary to suspend itineraries for a period of 12 weeks.

Cheese-milk Cooling Demonstrations.

Ten such demonstrations have been organised during the year in four different cheesemaking areas. The co-operating farms have been equipped with the necessary cooling facilities, consisting of a tower cooler and surface milk cooler. Milk from these farms is very much better in quality when cooled than when forwarded uncooled, as shown by the methylene blue tests. The demonstration is being taken a step further in one area, to show the difference in quality of cheese made from cooled and uncooled milks from the same farms. The first vats of cheese have been manufactured, and they will be examined at intervals during ripening.

Sire Subsidy.

During the year only three farmers received assistance. Two bulls were of the Guernsey breed and the other A.I.S.

Rebate of Freight on Bulls.

Applications were approved in respect of the refund of freight, intrastate, paid on the transport by rail of 118 bulls, the progeny of female stock entered in the Advanced Registers of the various Breed Societies. The expenditure amounted to £981 13s. 3d.

GENERAL.

A considerable proportion of the time of Branch officers was occupied in the administration of the Dairy Produce Acts on farms and in factories. Reports indicate that farmers are making every effort where necessary to improve the standard of dairy buildings, but shortages of cement and galvanised iron seriously limit the new buildings and renovations intended.

Other activities occupying the attention of officers include the conduct of examinations for appointment as Dairy Officers, and for certificates of competency under the Dairy Produce Acts, examination of factory accounts, statistics of manufacture, payouts and gradings of butter and cheese, control of transport of dairy produce, general advisory correspondence, radio talks and articles for the *Queensland Agricultural Journal*.

Table 15 indicates the volume of extension and regulatory work performed on farms and in factories.

Listed below are the farm and factory visits carried out by the Brisbane Milk Board officers and field officers of the Branch on registered Milk Board producers and milk factories.

TABLE 15.

SUMMARY OF FIELD STATISTICS, 1952–53.

District.	Farm Visits.	Orders.	Herd Book Tests.		Factory Visits.			Suppliers Tests.	Factoy Tests.
			Herds.	Cows.	Butter.	Cheese.	Milk.		
Brisbane	3,390	592	119	1,571	429	..	216	5,757	491
Brisbane (Milk Quality Control)	2,819	454	26	767	111	8	453	12,764	419
Downs (Toowoomba)	4,020	2,240	49	1,569	281	222	37	13,927	1,679
Downs (Warwick)	2,355	300	69	1,494	192	149	59	6,917	2,800
Rockhampton	2,505	162	85	1,479	194	20	68	2,910	1,279
Maryborough	3,040	415	133	1,695	311	9	73	952	1,025
Gympie	4,730	349	155	1,357	499	48	73	6,718	1,202
Northern	772	317	20	174	93	..	122	3,302	1,470
	23,631	4,829	656	10,106	2,110	456	1,101	52,247	10,383

—	Farm Visits.	Factory Visits.
Milk Board Officers	2,113	690
Divisional Officers	1,781	886
	3,894	1,576

STAFF.

Three officers resigned their positions during the year and six new officers were appointed. Four transfers were effected.

DIVISION OF DAIRYING.

DAIRY RESEARCH BRANCH.

Mr. L. E. Nichols, Director of Research.

The primary objective of the Dairy Research Branch has been to conduct original and applied research into the bacteriological, chemical, and manufacturing problems of the dairy industry, and to provide a laboratory advisory service associated with the production, manufacture, and distribution of milk and milk products. The attainment of a higher standard of efficiency has been encouraged by implementing laboratory quality control schemes for the butter, milk, and cheese industries.

To avoid overlapping and ensure the best disposition of staff, separate dairy products have been allotted to individual officers or laboratory sections for investigation or control work. Two specialist officers, who were trained in New Zealand under scholarships, are now working on problems of the butter and cheese industries, respectively.

The Brisbane laboratory has been principally concerned with market milk and milk products, dairy chemistry, biochemistry, and chemical engineering. The chemical engineering service provides advice on farm and factory water supplies and their treatment, farm cooling and refrigeration, heat and power requirements for factories, and factory planning and equipping. A sub-laboratory at Hamilton has been engaged exclusively on work for the butter industry.

The Toowoomba laboratory has specialised mainly in cheese and cheese starter problems. As it is adjacent to the cheese industry, cheese starter cultures are distributed from this centre.

A further decentralisation of technical services has been initiated with the establishment of a regional laboratory at Murgon in the South Burnett district (Plate 1). Although the laboratory was opened only in December 1952, the response and appreciation by both factories and farmers has been most gratifying, and despite the short time that has elapsed, it seems certain that the decision to provide a local service for the Burnett district will be fully justified.

Plate 1.

THE DAIRY RESEARCH LABORATORY, MURGON.

In addition, a laboratory is in the course of being established at Malanda and it is anticipated that it will commence operations in July, 1953.

INVESTIGATIONS.

Milk.

Seasonal Variations in Milk Composition.—Further studies on the decline in the composition of market milk during the late winter and early spring months were undertaken during the year. Consideration was given to the economic aspect of feeding long roughage, a practice found in previous trials to result in an appreciable improvement in milk yield, butterfat content, and average test. An attempt to check on the previous year's results was also made by feeding herds on three selected farms.

On these three farms, seed of white panicum and Sudan grass, sufficient to sow six acres on each farm, was provided. Long hay (Plate 2) has been harvested on two farms, but the crops were unsatisfactory on the third. Particulars of total costs have been recorded and it is hoped that at least one herd can be fed experimentally during the critical months to enable an economic appraisal of the practice to be studied.

Plate 2.

LONG SUDAN GRASS HAY, GROWN AND STORED ON A BEAUDESERT FARM FOR ROUGHAGE FEEDING EXPERIMENTS.

Results of the feeding trials carried out during the year again indicated a serious decline in milk composition, particularly in the morning's milk. It was, however, somewhat modified by the better seasonal conditions experienced during the year. Responses to the feeding of long roughage were again evident, although not so pronounced as in previous trials.

During the year, a survey of average fat tests on bulk raw milk at a large city pasteurising plant was made from results obtained over several years and from data available from herd recording. This revealed that the decline in the fat percentage of milk in the late winter and early spring appears to be of State-wide significance.

The investigation has also been extended to the cheese industry, where variations in the cheese-yielding capacity and clotting ability of milk are being examined. Calcium and phosphorus contents of the cheese milk from a farm in the Pittsworth district, as well as in the blood of the cattle, are being investigated and correlated with manufacturing characteristics of the milk. Feeding trials using Calphos have commenced in conjunction with the Cattle Husbandry Branch. These will continue for a period of 12 months, after which the results will be interpreted.

Milk Quality.—A considerable amount of research work has been carried out in connection with market milk, particularly regarding raw milk quality, keeping quality of pasteurised milk, laboratory testing techniques, &c.

The wide seasonal variation in the bacteriological quality of Brisbane's raw milk supply has been shown to follow closely the mean air temperature. During warm weather, when the mean air temperature ranges from 75°F. to 80°F., 50–60% of all milks on arrival at the factory, fail to reach a methylene blue standard of 4 hours. On the other hand, during cool weather, with a mean air temperature of 60°F., only 7% of milks fail.

The methylene blue reduction time of raw milk has been shown to be very greatly affected by time and temperature of storage prior to testing. The effects are of such magnitude that the test results on farm milks during warm weather become a measure more of storage than of production methods on the farm. Work is now continuing in an effort to evolve a simple method of compensating the modified methylene blue test so as to more accurately gauge the conditions of farm production, taking into account the quality of the milk, temperature and distance of transport.

The influence on milk quality of factors attributable to the milk can has been investigated. They have been found to cause a pronounced fall in the reduction time. The effect increased greatly with increasing temperature and time of transport while the milk was contained in the can.

On arrival at a factory, raw milk is usually cooled and held for some time before it is pasteurised. The effect of the storage of the raw milk on the quality of the milk after pasteurisation has been examined. Although storage produced a significant increase in the plate count following pasteurisation, it was considered insufficient to have any bearing on ultimate quality.

Keeping Quality of Pasteurised Milk.—Evidence obtained as a result of numerous tests on pasteurised milk supplies reveals that after 24 hours' storage the milk shows varying degrees of decline in quality, dependent on the temperature at which it is stored.

When temperatures exceed 70°F., the keeping quality shows a sharp decline. Defects were less marked in samples stored in the ice-box, although still appreciable, particularly after 36 hours' storage. Refrigerated samples showed fewest defects and kept best, but flavour defects occurred after 24 hours' storage.

As would be expected, some defects were more pronounced following delays in deliveries to consumers.

Exposure to direct sunlight for about one hour, as is possible in the course of delivery, did not materially alter the trends. However, "oxidised" flavour defects were intensified in all samples. When ice had run out in the case of the ice-chest for 6–18 hours, increased bacterial development was evident, flavour defects were often accentuated and the keeping quality reduced.

It is concluded that if quality is to be maintained, daily milk deliveries are desirable, even for households provided with refrigerators.

The results of the laboratory tests on the keeping quality of pasteurised milk, without prior storage, are as shown in Table 1.

TABLE 1.

KEEPING QUALITY TESTS.

(No Preconditioning of Samples.)

Time of Storage.	Method of Storage.			
	Room Temperature.	70° F.	Ice Box.	Refrigerator.
	PERCENTAGE FAILURES.			
24 Hours—				
M.B... ..	85·7	85·7	14·3	Nil
A.	71·4	100	14·3	Nil
P.C.	100	100	28·6	Nil
F.	100	100	57·1	42·9
36 Hours—				
M.B... ..	100	100	28·6	14·3
A.	100	100	14·3	Nil
P.C.	100	100	42·9	Nil
F.	100	100	100	42·9
48 Hours—				
M.B... ..	100	100	28·6	14·3
A.	100	100	14·3	Nil
P.C.	100	100	42·9	Nil
F.	100	100	100	42·9

M.B. = Methylene blue test.
A. = Acidity development greater than 0·02 per cent. as lactic acid.
P.C. = Increase in plate count of 200,000 or more.
F. = Flavour defects and appearance.

Laboratory Technique.—Studies have been made of laboratory testing techniques with the object of evolving methods both more rapid and giving results of more significant application to practical conditions in the milk industry.

Experiments were conducted with tetrazoleum salt in an effort to discover its efficiency as a rapid platform test for gauging the bacteriological quality of raw milk supplies. The salt was found to be of value only in cases of very heavily contaminated milks.

The approved procedure for the methylene blue test is to invert the tube of milk half-hourly during the test. Trials were carried out to determine the effect on the results of the tests of not inverting the tubes. Poor correlation existed between the "inverted" and "uninverted" tests. The average "inverted" time was found to be approximately three-fourths of the "uninverted" reduction time. Because of the widespread use of the methylene blue tests in market milk and cheese factories, the results of investigations emphasise the necessity for adhering to the specified procedure of inverting the tubes half-hourly during the test.

Ascorbic acid determinations were made on raw and pasteurised milk samples, using the method of Sharp. No significant difference was noted in the values obtained in raw and pasteurised milk.

As nylon has replaced cotton filters in most commercial operations, experiments are being made on the use of nylon filter cloth for the filtration of milk. Runs and observations are being made on a plate-type milk pasteurising unit at a large city plant under commercial production conditions.

Butter.

Microscopic Appearance.—Following the initiation of this test last year as a means of gauging the thoroughness of working during butter manufacture, further work has been carried out on the practical applications of the method. A comparison has been made of the number of water droplets greater than 30 microns in diameter in the freshly churned butter with that subsequently present at the time of grading. Theoretically, it was thought that in some churnings, particularly if somewhat underworked, migration of water to areas of higher salt concentration would occur after a short period.

Typical results obtained during this investigation are shown in Table 2. In the first instance—churning A—the high droplet counts at the time of grading (i.e., 4 days after manufacture) were due to the migration of water, the effect being very pronounced when underworking occurred. The second example—churning B—indicates no evident migration of water, probably due to a more even distribution of salt.

TABLE 2.

Churn A.			Churn B.		
No. of Revolutions.	No. of Droplets Greater than 30 Microns per c.c. (In Thousands).		No. of Revolutions.	No. of Droplets Greater than 30 Microns per c.c. (In Thousands).	
	Fresh.	4 Days.		Fresh.	4 Days.
45	100	375	40	222	232
53	106	560	52	222	248
61	17	293	59	172	197
69	23	213	66	139	152
77	5	156	74	25	33
85	..	58	96	less than 1	less than 1
96	..	25			

It would appear, therefore, that routine results employing this test can indicate either underworking and/or changes due to the migration of water. Differentiation between the two factors as a cause of high droplet counts requires detailed observation at the factory concerned.

A comparison of the microscopic method with an overseas method that uses indicator papers was carried out. Results showed that the former was more sensitive and more reliable as a basis for routine control purposes.

Fat Losses during Manufacture.—The investigation into the extent of butterfat losses during churning was continued during the year. Results show that the overall position is satisfactory, although losses which can be regarded as extreme have occurred with all types of pasteurising equipment. In all, 312 trials were carried out in 30 factories, overall average losses varying from 1.01% to 1.51%. Further, it has now become evident that the main influencing factors are:—

(1) The dilution of the cream during processing.

(2) The extent of agitation given to the hot cream.

(3) The temperature to which the cream is cooled.

Further experiments to evaluate these specific factors more accurately have been commenced, with attention being paid to the economics of cream processing. This aspect is very important when the initiation of practical measures to reduce fat losses is contemplated.

Keeping Quality.—Investigations on the keeping quality of butter have been continued with the analysis of 31 butters before and after three months' storage. Results this year showed a considerable improvement compared with the previous two years. The improvement is shown in Table 3, the extent of oxidation during storage being indicated by the peroxide values.

TABLE 3.

KEEPING QUALITY OF BUTTER.

Year.	Seasonal Conditions.	No. of Samples.	Range of Peroxide Values after Storage.				Average Peroxide Value.
			Less than 0·16.	0·16–0·30.	0·31–0·60.	More than 0·60.	
1951	Poor ..	29	10	10	7	2	0·23
1952	Poor ..	29	9	11	5	4	0·31
1953	Good ..	31	20	6	5	0	0·16

In considering these results, cognisance must be taken of the fact that, although the studies were carried out at the same period of each year, seasonal conditions were markedly different. The possibility exists, therefore, that the tendency of butter to suffer oxidation during storage may depend materially on this factor, and it is proposed that this aspect of the problem should receive consideration in the future.

Churn Timbers.—Due to the rapid deterioration of certain timbers used in churn manufacture, consideration has been given to the desirability of initiating an effective treatment to ensure a longer useful life period. Various imported timbers, hitherto chiefly used and found satisfactory, are now largely unavailable and substitution with local products is almost imperative. North Queensland kauri pine has been used to quite an extent, but has been found to fail badly after a few years, due to fungi gaining entry from the outside surface and attacking the timber. A trial churn is now being manufactured and is to be treated externally with zinc napthenate before installation in a butter factory. Supervision of the treatment will be shared with the Forestry Sub-Department and observations will be made continuously of the effect of treatment, both on the churn and on the quality of butter manufactured.

In the meantime, attention is being given to testing other Queensland timbers as likely sources of supply for churn construction. It is hoped that a small experimental churn made up of different timbers can be made for this purpose, an additional value of such being its use in investigating many other outstanding problems associated with butter manufacture.

Extraneous Matter.—It is of great importance that no foreign matter should gain access to butter at any stage of the manufacturing process. On overseas markets such a fault will seriously jeopardise the reputation of a country's produce and every possible precaution is essential to avoid its occurrence. For this reason, it is considered desirable that information on this subject should be included in routine Butter Improvement Service reports. C.S.I.R.O. has developed a method applicable to butter, and the necessary laboratory equipment has been obtained. Preliminary trials have commenced to gain an understanding of the method and clarify the setting of standards before the introduction of routine extraneous matter examinations.

Cheese.

Improved Cheese Quality.—Cheesemaking trials are being carried out at Murgon to determine the most efficient and economical method of cooling milk on the farm before transport to the factory. The relative merits of uncooled and milk cooled on the farm by the tower water-cooling system and by farm refrigeration are being evaluated. Trials will be repeated over a period of a year to determine the influence of seasonal conditions. Grading results to date tend to favour cheese made from refrigerated milk.

Bacteriophage.—As in previous years, phage infection of starter cultures still presents a hazard to cheese quality. Investigations carried on over a period of years have resulted in the publication of a pamphlet incorporating all precautions proved of value against phage infection. Studies are now in progress on many modifications and new methods suggested, with the object of gaining the fullest information. Such include trials with new starter strains, phage control by ultra-violet light, phage resistance in cultures, methods of phage dissemination, its incidence in factories and behaviour in the vat, and the influence of the time at which phage gains entrance during the cheesemaking process.

Mould Control.—The use of ultra-violet lamps to control moulding of cheese in curing rooms has been tried on a large scale at one big cheese factory. Observations have shown that the radiation from such lamps in itself is insufficient to exert complete control of the mould, whereas good control has been achieved by removing the glass shields on the lamps. It is fairly certain that the main controlling factor is the ozone produced by the unshielded lamps and not the ultra-violet radiation. The respective importance of these two factors is being evaluated.

Fly Control.—Following preliminary work last year with dieldrin, a new insecticide, for the control of flies on dairy farms, a trial has been made to evaluate its efficiency in cheese factories. Despite some success, it was found imperative also to control fly breeding grounds, especially adjacent to factory buildings. For this purpose 7% BHC was found effective, while the best control within the factory was achieved by using 5% DDT sprays after completing the day's cheese manufacture. Care has been taken to wash down all equipment carefully after spraying.

Processed Cheese Spoilage.—An investigation was carried out to determine the reason for extensive mould growth on the exterior of processed cheeses. The wrappers were subjected to a series of tests, and the conclusion has been reached that the waxing was too thin and not evenly distributed. It was considered that subsequent rupture of the wrappers was the indirect cause of the mould growth.

General.

Active Chlorine.—Following observations made on the use of various commercial chlorine solutions under farm and factory conditions, it was thought possible that solutions of the same strength may possess different degrees of bactericidal activity. To date, the chlorine strength and bactericidal efficiency of three proprietary brands of chlorine solution have been evaluated without any definite conclusions resulting. It is, however, intended to extend the work to other commercial lines available, after which the results as a whole will be correlated and studied.

Water Treatment.—Because of the necessity to use very hard waters on many farms and in factories, this problem has received considerable attention throughout the year. Many satisfactory treatment plants are now in operation, and at one large factory using up to 20,000 gallons of water daily, an economic appraisal of the value of water treatment is being made. Although all required data are not yet available, calculations have shown that the saving in pipeline replacement alone amounts to £350 per annum, the previous disintegration of lines being due solely to the hard corrosive water. Repairs and maintenance to boilers and can washer were also previously unduly high and even stainless steel vats were found to suffer pitting following exposure to the water supply in use.

As old tanks, set up and cemented by the factory staff, have been mainly used, the cost of installation has been less than the saving on piping in one year. Treatment costs have amounted to approximately £140 for the one year's operation.

Can Washing.—A commencement has been made to determine the efficiency of can washing, particularly in milk plants, with a view to improving techniques so that a satisfactory bacteriological standard for empty washed cans may be achieved. Both the rotary can washer and the straight-through type are being used in the investigations.

Can Corrosion.—A case of serious deterioration in milk cans at a number of cheese factories on the Downs was investigated. It was found that the usual practice of returning whey to the farms in milk cans was being carried out, with the difference that hot whey, after sterilization, was run into cans and allowed to stand overnight before despatch. Usually whey is allowed to cool for about seven or eight hours before being run into cans. The variation in practice as indicated, although initiated to facilitate working routine at the factories, had necessarily to be discontinued to eliminate the trouble.

LABORATORY CONTROL SERVICE.

In conjunction with the Field Services Branch, the Branch has continued to provide a laboratory control service to assist in the improvement of quality and efficiency in the industry.

Milk.

The market milk industry continues to expand and much capital equipment has been installed in the past 12 months. The Brisbane and Toowoomba laboratories have continued control work for the Brisbane Milk Board, and have also given technical aid to both city and country receiving depots and milk-pasteurisation plants. The Murgon branch laboratory has supervised milk quality at the Murgon and Maryborough factories, and a similar control will shortly be operating over factories in North Queensland with the opening of a laboratory at Malanda. Table 4 summarises the results obtained at Brisbane, with the previous year's figures given for comparison.

TABLE 4.
SUMMARY OF MILK EXAMINATIONS.

—	1951–52.	1952–53.
Platings—bottled pasteurised milk ..	1,333	1,336
Presumptive coliform tests	1,337	1,270
Phosphatase tests—		
Number	1,407	1,068
Percentage negative	99·7	99·5
Methylene blue tests at depots—		
Number	87,108	75,502
Percentage below 4 hours	8·3	3·7
Microscopic examinations	5,315	5,956
Fat tests at depots—		
Number	31,507	32,028
Percentage below 3·3%	24·0	7·6
Pasteurised milk fat tests	1,534	1,232
Average fat percentage	4·0	3·83
Bulk milks received from country depots	—	
Methylene blue tests	2,896	6,023
Fat tests	2,726	5,451
Factory surveys	75	60

In addition, bottled pasteurised milk from the Toowoomba and Warwick factories has been regularly sampled and tested at the Toowoomba laboratory. These samples have been examined for fat, plate count, presence of coliform organisms and total solids and also submitted to the phosphatase test for pasteurisation efficiency.

Raw Milk Quality.—Regular methylene blue testing of raw milk supplies has now become an integral part of the market milk industry. Some plants have elected to perform the test daily. Where this practice has been adopted, a noticeable improvement in raw milk quality has been achieved.

Some plants are now conducting their own microscopic examinations. This is a very pleasing feature, as it indicates the willingness of processing plants to play a part in the drive for better quality in raw milk. In the final analysis, it has to be admitted that the quality of the pasteurised product is a function of the quality of the raw milk. Pasteurisation is neither a cheap nor an efficient way of cleaning up a bacteriologically unsatisfactory milk supply.

More milk is now being transported by tanker (Plate 3). This is a very pleasing development as effective can washing presents a problem. Many cans were examined during the year at two Brisbane milk depots; very few were found to be of a satisfactory bacteriological standard.

Plate 3.

MILK TANKERS AT THE MALANDA FACTORY ON THE ATHERTON TABLELAND.

A large number of suppliers' milks was examined during the year by means of the roll tube method for heat-tolerant but inert bacteria which survive pasteurisation. This is an economical method of classifying a large number of milks for these bacteria. Suppliers whose milks exhibited high counts of thermoduric bacteria were notified, and in some instances, field officers visited the farms to help effect an improvement. The majority of farmers proved willing to co-operate when the position was explained to them, and a marked improvement followed in most instances.

Pasteurised Milk Quality.—High thermoduric counts still constitute the main cause of failure of pasteurised milks to conform to the regulation count of less than 50,000 colonies per ml. There would seem to be some necessity for a pre-pasteurisation standard in order to prevent the contamination of bulk milks with thermobacteria.

The presumptive coliform test continues to be the most satisfactory test for detecting the post-pasteurisation contamination of milk. Bottled milk from efficiently operated plants had no difficulty in conforming with the laboratory standard of a negative result in 1 ml. of milk.

In the few instances where a positive result was recorded in the phosphatase test, the fault was traced to the contamination of the pasteurised product with droplets of raw milk.

Factory Surveys.—In all, 75 full bacteriological surveys were made during the year by officers of the Brisbane, Toowoomba and Murgon laboratories. Many other visits were made to factories during the period in regard to special problems.

Viewed generally, the results show that the main sources of contamination of the pasteurised product appear to be the fillers and the bottles. Careless operatives contaminate the filler valves, with consequent contamination of the pasteurised product. Bottle washing in some cases leaves much to be desired. Washers will only deliver a satisfactory bottle if detergent strength is maintained and the washer operated at the correct temperature. A better realisation of these fundamentals would ensure a more satisfactory standard of cleansed bottles.

School Milk.—With the introduction of school milk, some additional problems have arisen. The one-third pint bottles are more difficult to clean and sterilize than pint bottles, and in some cases companies have overcome this problem by making special adjustments to the bottle-washing machines. Samples of the milk made available are being regularly tested under the laboratory quality control service.

Butter.

The routine examination of butter samples chemically and bacteriologically for control and advisory services was continued, together with a full programme of factory surveys and investigations.

During the year, 2,249 churnings of butter were subjected to bacteriological analysis. The average bacteriological quality index for all factories covered by the service was 241, the possible being 400. This figure is slightly higher than that obtained last year (237) but both indicate a good overall standard of hygiene in the butter factories.

A check on the chemical composition of butter manufactured was maintained, 2,247 samples being examined. For all factories the average butter composition was estimated as fat 82.22%, moisture 15.58%, salt 1.35%, curd 0.85%. Although these averages show a slight drop in the level of moisture and salt as compared with last year, it is considered that they represent a high standard of compositional control. The extra return to the industry during the year is estimated at £70,000, taking the present compositional averages against those at the inception of the Butter Improvement Service.

Estimations of the pH of butter serum were made on 1,085 samples; 8.75% were below 6.8, which is usually regarded as the lower limit if good keeping quality is to be achieved. One of the aims of the service is to reduce this percentage to negligible proportions.

A new feature of the routine control which has achieved prominence during the year has been the microscopic examination of all samples and their classification in terms of degree of working during manufacture. Table 5 shows the results.

TABLE 5.

Distribution of Results of Microscopic Examinations.

Period.	Percentage Distribution of Results.					
	No. of Samples.	Well Worked.	Fairly Well Worked.	Rather Under Worked.	Under Worked.	Very Under Worked.
April–June, 1952	224	50·8	24·6	17·9	4·5	2·2
July–September, 1952	490	56·8	23·1	11·9	5·1	3·1
October–December, 1952 ..	374	59·1	23·3	7·5	2·9	7·2
January–March, 1953	648	46·3	28·7	13·4	2·6	9·0
April–May, 1953	432	54·7	23·4	6·9	4·6	10·4
Total and Averages ..	2,168	53·5	24·6	11·5	3·9	6·4

The work to date has been mainly directed towards accumulating data and experience. The results show, however, that a high percentage (78.1) of the samples show a good standard of working during manufacture.

Thirty-six butter-factory surveys were conducted by officers of the Brisbane, Toowoomba, and Murgon laboratories. Advice was given on necessary improvements in equipment, methods and hygiene, while in some instances specific problems involving taints, butterfat losses, water supplies, refrigerating brines, &c., were investigated.

A new feature of advisory work, worthy of mention, is the commencement of production of roller dried skim-milk and dried whey. Initially, much technical advice and frequent chemical analyses were sought. The manufacture of these products, together with dried buttermilk, which has been carried on for some years at certain factories, is noteworthy as a start in the fuller utilisation of milk from the farm.

Cheese.

Cheese factories were visited on 44 occasions by officers of the Brisbane, Toowoomba, and Murgon laboratories. Full surveys were conducted in most instances and advice given regarding cheese manufacture and storage, the handling of cheese starters and the cleaning and sterilizing of factory equipment. Cheese quality was invariably examined, and 101 samples of cheese were analysed for fat and moisture in the laboratories. Wherever possible, the cheese-yielding capacity of the milk received and the extent of the butterfat losses were determined; the overall loss was found to be approximately 9-10%. Wherever economically feasible, the installation of whey separators was urged and eight factories are now practising this economy, which was found to average 7-8% of the factory butterfat intake. It is considered that whey separation would also prove beneficial to approximately half a dozen more factories not so equipped.

The Branch has continued to supply high-quality cheese starter cultures to factories in the State, and 968 were distributed during the year. From observations made during visits, it is apparent that there is room for much improvement in the utilisation of starters by many cheese factories. A considerable threat to the consistent production of high-quality cheese exists in those factories which are using single-strain starters but have neither the proper apparatus for culturing them nor a system of rotation of strains. These factories are constantly in danger of the occurrence of "slow" or "dead" vats as a result of attack by bacteriophage, and every endeavour is being made to have their starter culturing methods and facilities improved.

Factory Waters.

Following an initial survey of water supplies available to many dairy factories, a control scheme has been initiated to encourage managements to undertake the proper treatment or conditioning of water as required for the many and varied factory usages. The chemical composition of the water used has a profound influence on cleaning efficiency and its suitability for boilers, condensers and other engineering applications, while good bacteriological quality is vital for water for butter washing and also important for that used for washing processing equipment.

Plate 4.

THE SEVEN WATER TREATMENT TANKS AT BEAUDESERT BUTTER FACTORY, WITH A TOTAL CAPACITY OF 20,000 GALLONS PER DAY.

During the year, 149 samples of water from factories were analysed in the Brisbane laboratory. Treatments were worked out experimentally in many instances, and visits were made by laboratory officers to instruct factory personnel in carrying out the treatment in practice. The number of treatment plants (Plate 4) in operation is steadily increasing and it is likely that the results being achieved will stimulate other factories to consider their introduction in the future. As required treatments are by no means static but vary with the marked seasonal change in water composition, the main function of a control scheme is to ensure that the best results are being obtained at factories where treatment plants have been installed.

GENERAL.

Farms.

Many visits have been paid to farms, particularly by officers stationed at the country laboratories. Specific problems, such as persistent taints of unknown origin, mastitis, low-quality milk and cream, farm cooling, etc., have been the reason in most instances, although complete bacteriological surveys have necessitated some visits.

Analytical.

A total of 1,059 samples was submitted for general analysis. They included milk, skim-milk and butter milk and their powders, butter, cheese, cream, casein, whey concentrate, margarine, waters, detergents, scales, brines and miscellaneous samples. Many analyses were for advisory purposes, although a considerable number were made in connection with current investigations.

A total of 9,215 pieces of dairy glassware was tested for compliance with the requirements laid down by the Dairy Produce Acts. Of these, 2,813 pieces (30·5%) were rejected for failing to comply with the necessary standards. The high percentage of glassware rejected was largely due to the evident confusion among manufacturers resulting from varying standard requirements laid down by the different Australian States. The consideration being given by the Standards Association of Australia to drafting a uniform standard for glassware satisfactory to all would thus appear fully justified.

Publications.

Five papers for advisory purposes were prepared and published by officers of the Branch; seven radio talks and addresses were also given.

DIVISION OF MARKETING.

MARKETING BRANCH.

Mr. H. S. Hunter, Director of Marketing.

MARKETING.

General.

The easing of the post-war period of rapid and continuous inflation has brought many marketing problems into strong relief. It has coincided with the definite modification of the United Kingdom policy of Government trading; with a readier availability of imports such as vegetable oils; with currency difficulties in many of the countries such as Europe, which have been importing significant quantities of our produce, particularly coarse grains; with, in other words, a definite change to a buyer's market.

Naturally enough this has had a definite impact on the marketing organisations set up under the various Acts administered by the Division and on each of which the Director of Marketing is *ex officio* a member. Much closer attention has had to be given to selling and marketing policy. Not that the physical problems of handling growers' produce under conditions of labour shortage which have been so much to the fore in recent years have disappeared, but the straight-out selling problem has definitely loomed as of equal importance.

The tobacco and potato industries have had to receive the very close attention of officers because of this development. Tobacco, because of the extraordinary reverses the industry suffered during 1952 and 1953, when large amounts of leaf were left unsold on auction floors, was the subject of a considerable number of conferences between the State and Federal Governments, the manufacturers and The Tobacco Leaf Marketing Board. The potato industry encountered acute marketing difficulties during the year and had to be assisted by Government guarantees; this called for careful checking of the market position over long periods. The ginger industry, too, might be cited as an example of the impact of consumer resistance and of difficulties arising from the uncertainties of the market position.

Similarly, the dairying industry has had to meet growing competition from margarine and also consumer resistance. The egg industry has had to consider the changes in its overseas selling methods that might be needed in the absence of the security of a contract with the United Kingdom. The wheat industry faces the need to achieve some form of plan to take over from the stabilisation scheme which finishes with the current crop.

The volume of production as a result of splendid seasonal conditions reached a high level. Of the major industries, the Queensland wheat harvest of 18½ million bushels has established a new record, as will a sugar cane crop estimated at 9,000,000 tons. The 1952-53 Australian wool clip of 3,851,268 bales which was cleared in June was also an all-time record. Sales of wool on the Brisbane market amounted to 530,052 bales, an increase of 13% on the previous year. Queensland butter and cheese production over the same period increased by 76% and 101% to 49,425 tons of butter and 9,439 tons of cheese respectively.

In addition, prices generally for primary products have been good. Of particular interest is the recovery in market prices for wool (the most important export item), which at the end of season sales appear to have attained relative stability at what is regarded as satisfactory levels. Consequently, both factors, increased production and higher prices, have materially contributed to the general improvement in the national economy, which is reflected in an increase estimated at £172 million in the value of rural exports as compared with 1951-52.

A detailed description of the activities of the various marketing boards, supported with statistical data, will be given as in previous years in the annual report by the Director of Marketing to the Hon. the Secretary for Agriculture and Stock as required under *The Primary Producers' Organisation and Marketing Acts, 1926 to* 1951. A brief review of major marketing developments in some of the industries in respect of which statutory boards have been established under the abovementioned legislation is given below.

The Dairying Industry.

Following the cessation of butter rationing throughout the Commonwealth from June 16, 1950, there was experienced an appreciable increase in per capita consumption, so that during the following year consumption was virtually at a level with that which existed prior to the introduction of rationing in June 1943. However, with the increase in the retail price towards the end of 1951 from 2s. 2d. per lb. to 3s. 1½d. per lb. and the more substantial increase to 4s. 1½d. per lb. from July 1952 (an increase of 90% within 12 months) the serious buyer resistance which has arisen was not unexpected. It is estimated Australian *per capita* consumption has fallen 8% in the last 12 months. Increasing competition from cheaper substitutes such as margarine has accelerated this development. In the case of cheese, similar buyer reaction has also been experienced.

Having regard to this development and the conditions laid down in the new Commonwealth 5-year stabilisation plan, which operated from July 1. 1952, and which *inter alia* provides a guaranteed price for butter and cheese manufactured in Australia only to the extent of local consumption plus 20% thereof to cover export (the previous plan provided a guarantee on total production), it is unlikely, as export prices are lower than domestic prices, that for the 1952-53 season total sales realisations plus subsidy will return to the producer of butter and cheese an average price equivalent to the guaranteed price of 4s. 6d. per lb. commercial butter (i.e., the accepted cost of production figure).

As an avenue of disposal of dairy produce surplus to Australian domestic consumption the United Kingdom market is invaluable. The economic importance of the export markets to the Queensland dairying industry is graphically illustrated in Figure 1, where the average volume of exports from Queensland of butter and cheese during post-war years is shown as percentages of total production.

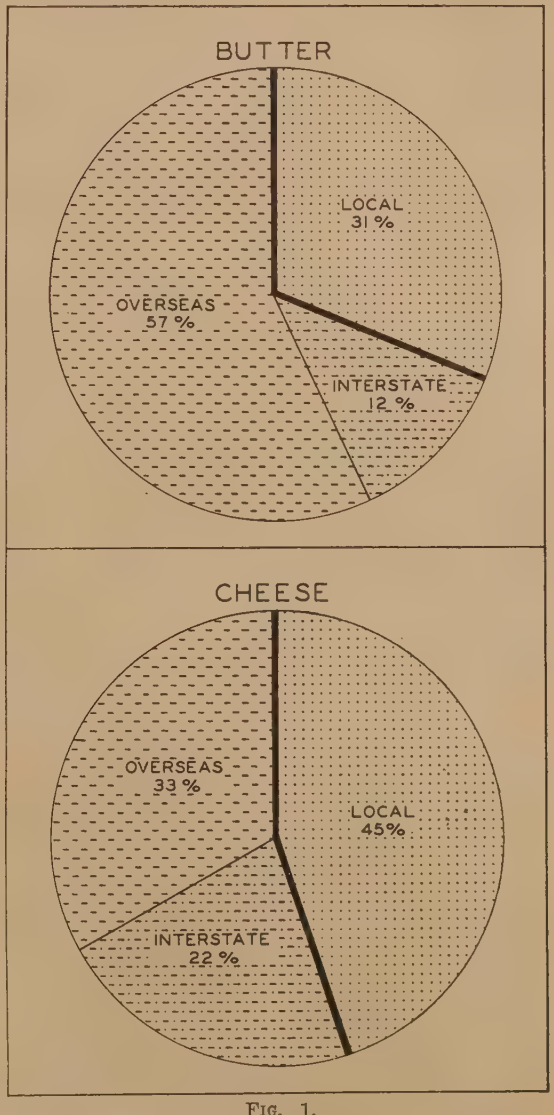


FIG. 1.

PERCENTAGE DISSECTION OF DISPOSALS OF BUTTER AND CHEESE MANUFACTURED IN QUEENSLAND DURING POST-WAR YEARS (1946-47 TO 1952-53 INCLUSIVE).

As Queensland normally exports a higher proportion of its production than other States the effect of the present unsatisfactory contract prices on returns of Queensland producers would be more severe but for the operation of the Commonwealth Equalisation Scheme. The effect of the U.K. contract price on overall returns during the year is demonstrated by the following figures. For 1951-52 the guaranteed price (i.e., the accepted cost of production at the factory) for butter was 429s. 1·09d. per cwt., while the U.K. contract price was 365s. 0d. per cwt., a difference of 64s. 1·09d. per cwt. For the 1952-53 season the guaranteed price (subject to the conditions of the new stabilisation plan) was 503s. 5·62d. per cwt. and the U.K. contract price 392s. 6d. per cwt., a difference of 110s. 11·62d. per cwt. The margin therefore has been widened by 46s. 10·53d. per cwt. an increase of 73%. In the case of cheese the margin has increased by 50%.

The Egg Industry.

As with the dairying industry, the fundamental economic factor influencing the egg and poultry industry has been the rapid increases in production costs. Although local sales to some extent have subsidised lower export returns, sales resistance on the domestic market has tended to retain egg prices at somewhat the same level as in the previous year. Being unable to absorb increased production costs, chiefly attributable to feed price increases, the industry in this State has focussed greater attention on ways of increasing efficiency by improved husbandry methods and the elimination of small uneconomic units either by going out of business or by enlarging flocks to achieve lower unit costs.

For the 1952-53 export season f.o.b. prices negotiated between the Australian Government and the United Kingdom Ministry of Food were 4s. 2¼d. per doz. for eggs in shell, (15 lb. pack) and 2s. 11⅝d. per lb. in the case of egg pulp, increases of 29% and 24% respectively on the previous year's prices.

As at May 31, 1953, the long-term contract between the United Kingdom and the Australian Governments, which has been reviewed from time to time since 1947, was terminated. This has followed from the policy of the United Kingdom Government to remove egg trading from official control. However, for the year ended May 31, 1954, and to facilitate the transition to a private trade basis, the United Kingdom Ministry of Food will continue to exercise supervision of imports. Accordingly, a fixed price of 3s. 3·375d. per lb. f.o.b. Australian ports for egg pulp has been negotiated for this period, but for eggs in shell a free price market will prevail. To organise the sales distribution of Australian eggs and egg products in the United Kingdom the Australian Egg Board has set up office in London. Whether or not egg trading will revert to a trader to trader basis (i.e., State Egg Marketing Board to British importer) subsequent to May 1954 is a matter of some concern to the industry and will be a subject for consideration by the industry during the coming financial year.

Receivals of eggs by the two Egg Marketing Boards operating in this State during 1952-1953 continued the decline exhibited since 1948-49. In South Queensland receivals amounting to 7,487,517 doz. eggs were the lowest since 1943-44. In Central Queensland receivals amounted to 110,647 doz. and were the lowest since the Central Queensland Egg Marketing Board was established in 1947. Eggs were rationed during the period of low seasonal production in South Queensland by as much as 50% of buyers' established quotas. In Central and Northern Queensland, local production had to be supplemented by supplies from The South Queensland Egg Marketing Board in an effort to meet demand.

During the year it appeared imminent that cold storage facilities for primary products awaiting shipment to the United Kingdom would be severely taxed. Accordingly, the Queensland Cold Storage Co-operative Federation Ltd., to ensure its own shareholders had adequate space, was obliged to restrict other customers. At this time egg export operations were approaching their peak and with no alternative space available the Egg Marketing Board experienced some concern. Fortunately, the position was relieved by an improvement in the shipping position.

The incident, however, served to draw attention to the advisability of the Board becoming a member of the Queensland Cold Storage Co-operative Federation Ltd., a policy which had been strongly urged by the Director of Marketing some years previously when consideration was being given to the Board's refrigeration activities. After some negotiation the Egg Marketing Board was allotted shares on the basis of the volume of the average annual production handled by the Board from 1948 to 1951.

The Board is now much more certain that adequate storage will be available when required, and thereby has been removed the cause for anxiety that has been experienced during recent years.

The Grain and Allied Industries.

Queensland grain production during the 1952-53 season was an all-time record, substantially exceeding consumption requirements and providing a considerable export surplus. This was in marked contrast to the previous season, when large quantities of wheat in addition to grain sorghum and maize had to be imported to meet requirements. It is estimated that over 24 million bushels of grain were harvested during 1952-53, and of this total wheat accounted for 18½ million, barley over 1½ million, grain sorghum 2 million and maize 2 million, with oats making up the balance.

The unusually large harvest was mainly attributable to the excellent seasonal conditions which prevailed throughout the whole of the winter growing season, but increased acreages of both wheat and barley were also responsible. The excellent winter season had a twofold effect on grain production; it ensured record or near-record yields of winter grains, and because of the abundance of natural grasses, the feeding of these crops to stock was less than normally practised. The summer grain crops were not so fortunate. Very dry conditions during the planting period resulted in reduced acreages. However, much of the prepared land was later planted to wheat and barley.

Queensland's total annual grain requirements are at present in the vicinity of 14 million bushels. Although consumption has fallen from the 1950-51 level, the decline is expected to be only temporary and has been due entirely to a fall in consumption by livestock. The decline in commercial poultry numbers and the abundance of natural grasses in the dairying districts for cattle have both resulted in lower consumption of feed grains. An increase in poultry flocks and the certainty of less favourable seasons than the one just past should see a return to the higher grain consumption level of over 15 million bushels in 1950-51.

Figure 2 shows changes in consumption in Queensland of the various grains in all forms over the past 13 years.

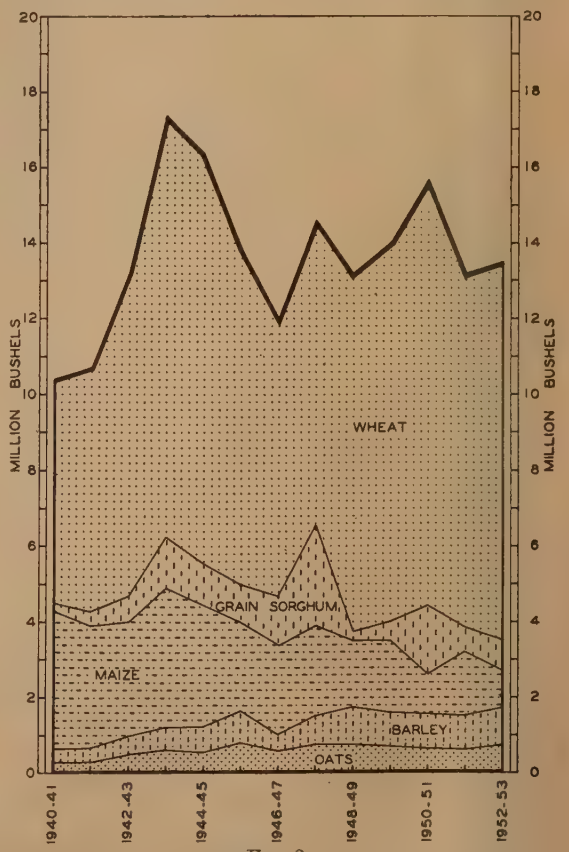


FIG. 2.

CHANGES IN CONSUMPTION OF GRAINS IN QUEENSLAND OVER THE PERIOD 1940-41 TO 1952-53.

As a result of good harvests in most overseas producing countries and the building up of tremendous stocks on the North American continent, instability of prices has been a feature of the market for all grains during the past eight months. Between October 1952 and the end of January this year overseas prices for malting barley fell from 18s. 0d. to about 14s. 0d. per bushel f.o.b. Australia, and during the following months many offers were even lower. Declining price levels have also been experienced for grain sorghum and maize. Export sales of grain sorghum at the close of the financial year were being made at £22 per ton, compared with up to £30 per ton at the corresponding time last year, whilst export maize was selling at about £26 per ton as against up to £38 10s. per ton last year.

In the case of wheat, overseas market prices remained at last year's levels, with Australian sales effected at 16s. 1d. per bushel and open market rates somewhat higher. Protracted negotiations for a new International Wheat Agreement and the refusal of the United Kingdom to sign the Agreement which was eventually drawn up by other wheat importers and exporters have left the future of prices uncertain. The Agreement which has been drawn up provides for maximum and minimum prices equivalent to 18s. 3½d. and 13s. 10d. respectively per bushel Australian currency in store at shipping port. However, as the United Kingdom is by far the largest importer both the future of the Agreement and the likely effect on prices are very much in doubt.

The Tobacco Industry.

During the past year the tobacco industry, which has been expanding steadily since 1948-49, suffered a severe check and the area planted for the 1952-53 crop fell to an estimated 4,339 acres from its 1951-52 level of 5,038 acres. Smaller acreages were planted in all districts but the decline was most marked in the recently developed coastal areas of both North and South Queensland. The total harvest has been estimated at 3,431,300 lb., compared with 4,666,699 lb. in 1951-52.

The fall in production cannot be attributed to seasonal causes, but at most entirely to the selling difficulties experienced during 1952. More than one-quarter of the leaf offered during 1952 was still unsold at the end of the year and the average price for the leaf which had been sold was only 89·42d. per lb., compared with 105.23d. per lb. over the whole of the previous year's crop. Many individual growers were left with a large proportion of their 1951-52 crops still unsold when planting was due to commence for the 1952-53 season, and this, coupled with uncertainty for the future, caused a number of growers to leave the industry and others to plant smaller acreages.

During the year a number of conferences were held among The Tobacco Leaf Marketing Board, the tobacco manufacturers and Commonwealth and State authorities in an endeavour to arrive at a satisfactory basis for the marketing of Queensland tobacco leaf, but to date no solution acceptable to both manufacturers and growers has been reached. The Tobacco Leaf Marketing Board has been pressing for increases in the requisite percentages of Australian leaf to be blended by manufacturers with imported leaf in order to qualify for the reduced tariff, and although these percentages have been increased during the year from 5% and 3% to 10% and 6% for tobacco and cigarettes respectively, this still falls far short of the figures of 20% and 15% which the Board maintains are necessary to ensure the absorption of all usable Australian leaf. Some aspects of a proposal for an average price scheme for tobacco leaf to be underwritten by manufacturers are at present being examined, but no finality has yet been reached.

In the meantime, the 1952-53 season's leaf is being sold on the auction and reserve basis which has been in operation since 1948. To date one sale has been held in South Queensland and 97% of the offering of 390,588 lb. of new season's leaf was sold at an average price of 105·84d. per lb., whilst three sales in North Queensland with a total offering of 1,830,636 lb. of new season's leaf have resulted in a clearance of only 80% at an average price of 102·94d. per lb. The South Queensland sale has been considered quite satisfactory, but much dissatisfaction has been voiced by The Tobacco Leaf Marketing Board with the results of the northern sales.

Fruit and Vegetable Industry.

The year under review was, in its opening stages, one of recovery from the drought of the previous year. Very good crops of winter vegetables were harvested but citrus and plantation fruit had generally been so badly affected by the drought that they produced small crops in 1952. A notable exception was the record strawberry crop. To dispose of the crop, which consisted of a large proportion of small berries fit only for jam making, the C.O.D. cannery relieved some small canners who refused to meet their commitments with growers.

In the metropolitan area there was also a record harvest of figs. These again presented a definite marketing problem. As with strawberries, the demand from canneries for fruit for jam making was limited by slowness of sale of the product, reflecting a definite buyer resistance to higher-priced jam.

A poor setting of fruit and subsequent hail damage resulted in the lightest harvest of apples on the Granite Belt for many years. The total crop was little more than one-quarter of the previous year's harvest. Stone fruits were also somewhat lighter this year, but the grape crop was a record, producing over 5 million pounds of table grapes.

Summer crops of pineapples in all areas were heavy. In South Queensland the crop was estimated at over 1,500,000 bushels. Winter crops are also expected to yield well. Canneries were able to accept all pineapples in excess of the market requirements for fresh fruit. The new cannery built by the Committee of Direction of Fruit Marketing at Koongal, Rockhampton, was in operation for the intake of the local summer crop. In Cairns, the Great Northern Co-operative Cannery Association Ltd. processed North Queensland fruit throughout the season.

There has of recent years been an expansion of pineapple growing in the coastal area from the Herbert River district, north of Townsville, to Bowen. Growers in this area have for some time been considering the practicability of establishing a factory outlet for pineapples from this area. There was previously a move to establish a satisfactory outlet in the form of deep-frozen products. However, this venture has now been abandoned and growers in this area have commenced a move for the establishment of a cannery at Townsville. An approach has been made to the Committee of Direction of Fruit Marketing to undertake construction of a cannery with the support of the local growers. No finality has yet been reached in this matter.

The main problem confronting the pineapple industry is the serious weakening of the overseas market for the canned product. Dollar markets are now strongly competitive. This has tended to concentrate heavier supplies on non-dollar markets. This tendency, allied with increasing production in other Commonwealth countries, notably Malaya and South Africa, and the general improvement in quantity and variety of food supplies on world markets, poses definite problems for the canning industry in this State. The whole of the output of Queensland canned pineapple for the current year has been sold to the British Ministry of Food, but there is little likelihood that similar arrangements will be available in future. Fundamentally, the problem is one of production costs, and as world markets become increasingly competitive means must be devised of keeping costs in our export industries at a competitive level.

The Cotton Growing Industry.

Cotton growing was an important industry in Queensland up to the outbreak of the war with Japan. In 1941 over 60,000 acres were harvested. When the war spread to the Pacific emphasis was placed on the production of food, and this factor, combined with the acute shortage of rural labour, caused a very steep decline in the acreage planted to cotton. In 1945 less than 8,000 acres were harvested. There was no significant recovery in the immediate post-war years and in 1949 plantings were so poor that less than 3,000 acres were harvested in 1950. There was a slight improvement in the following year which has continued since. The 1953 harvest is estimated at 9,000 acres. The acreage movements for this crop in the post-war period are shown graphically in Figure 3.

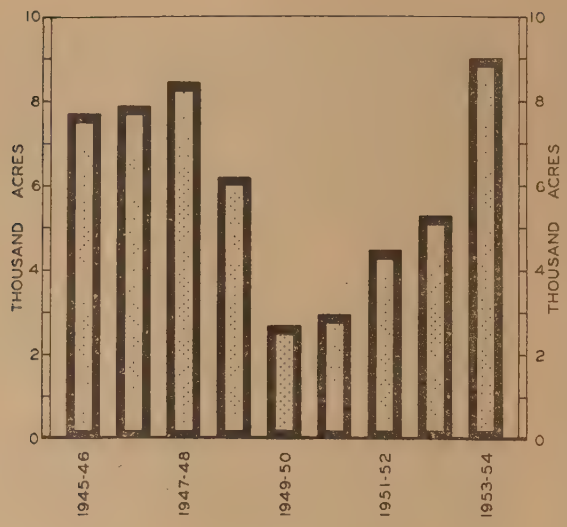


FIG. 3.
MOVEMENTS IN THE ACREAGE OF COTTON HARVESTED IN QUEENSLAND FROM 1945-46 TO 1953-54 SEASONS.

Sales of raw cotton in Australia were subject to price control in the immediate post-war years, but with the removal from price control in September, 1948, local sales have subsequently been made at prices approximating world parity. With a view to stabilising the industry the State Government supported an approach by The Cotton Marketing Board to the Commonwealth Government seeking a guaranteed price for a period of five years. By the *Cotton Bounty Act,* 1951, the Commonwealth Government guaranteed a price to growers of 9½d. per lb. of seed cotton for all grades higher than "Strict Good Ordinary" for a period of five years from 1st January, 1951, to 31st December, 1955. Rising costs made this guaranteed price inadequate and the State Government therefore supported a further approach to the Commonwealth Government for an increase in the guaranteed price to 14d. per lb. By the *Cotton Bounty Act,* 1952, a guaranteed price of 14d. per lb. of seed cotton was provided for all cotton harvested in 1953, but in respect of cotton harvested in 1954 and 1955 it was provided that the guarantee should be fixed by regulation between the limits of 9½d. and 14d. per lb. of seed cotton. The Cotton Marketing Board felt, however, that if increased plantings were to be encouraged it was essential for the Commonwealth Government to announce at an early date the guaranteed price for the following year's harvest. Here again representations were made by the Queensland Government to the Commonwealth Government, and an announcement was made in April, 1953, that the guaranteed price for the 1954 crop would be maintained at 14d. per lb.

Over the last year world prices for cotton have declined substantially. This created certain difficulties, for buyers, instead of taking up their allocations readily as would be the case in a time of rising prices, tended to hold off in anticipation of further price declines. In this connection a conference was held in Sydney in March at which representatives of the Department of Agriculture and Stock and the Board met representatives of the Australian spinners. There it was agreed that for the 1953 season knitting and weaving cotton would be accepted in weekly allocations on an equitable basis at current New York spot quotations.

Other Crops.

The 1952 peanut harvest of slightly more than 4,500 tons of nuts in shell was the lowest for many years. The small acreage planted reflected the very unfavourable seasonal conditions prevailing in the main growing area, the South Burnett district, at planting time. In this area late-planted crops also yielded poorly. For the 1953 harvest plantings were again below expectations, due once again to adverse planting conditions in the South Burnett district. The crop is expected to be about twice that of the previous season. Demand for edible kernels remains strong but the marked weakening in the world price for vegetable oils has reacted on the local price of peanut oil.

Large crops of potatoes were produced in both North and South Queensland in the winter of 1952. These coincided with good harvests in all Australian States. As a consequence, markets were glutted for the last six months of 1952. North Queensland growers particularly were seriously affected by these marketing difficulties, since there was no profitable outlet for their surplus production, and it is estimated that approximately half the crop was lost. In contrast, for the current season the demand for potatoes in the face of an expected Australian shortage is very keen.

Resulting largely from very adverse seasonal conditions, the 1952 harvest of ginger was the smallest for many years. The Ginger Marketing Board received only approximately 84 tons of green ginger. Notwithstanding this, strong price competition from imported ginger has made ginger growing uneconomic. The Board is of the opinion that the industry cannot survive without effective tariff protection, and a case has been stated to the Tariff Board, which held enquiries in Sydney and Melbourne in November and December 1952. The recommendations of the Tariff Board are not yet known.

Another minor industry which has declined further during the period under review is arrowroot growing. From the 1952 crop, The Arrowroot Marketing Board received approximately 140 tons from a total harvest estimated at 300 tons. The increasing failure of growers to support their Board has so weakened its bargaining powers that it is extremely difficult for the Board to stabilise the market.

STATISTICS.

The most significant development in the Statistical Section of the Marketing Branch during the year was the commencement of publication of Price Series Supplements to the monthly Report on Production Trends. The Supplements describe and illustrate movements, seasonal patterns, and trends in wholesale prices of selected commodities at the Brisbane Markets from 1st January, 1948. The first Supplement, dealing with pineapples, was issued with the March Report, and publications on lucerne, oranges and tomatoes in following months. The initiation of this series is the outcome of an analysis of prices and market information gathered by the Market Price Reporting Service since its inception in 1947.

In the course of its normal duties, the Statistical Section is responsible for the provision of such statistics as may be required for administrative and other purposes. To meet these demands the recording, analysing and filing of primary data derived from Marketing Boards and other organisations, as well as from the Market Price Reporting and Crop Reporting and Forecasting Services, is proceeding constantly. Through the Statistical Section a close liaison is maintained between the Department and the Agricultural Production Section of the Queensland Government Statistician's Office, which it is believed has had mutual advantages. Published Australian and International statistics are also filed in the Branch for reference purposes.

Crop Reporting and Forecasting.

It was reported last year that preliminary statistics were being collected for the purpose of inaugurating the periodical issue of reports on the poultry industry. Preparatory work was completed and the scheme embracing quarterly reports was launched with the issue of the first report (for the quarter ended 31st December, 1952) on 12th February, 1953. A second report for the quarter ended 31st March, 1953 was issued on 1st May.

Forecasting the production of any industry must be based on a careful study of the structure of the whole industry, including a complete analysis of its potential capacity and trends and an understanding of the industry's production factors and problems. Also, the mutual interdependency between the industry and other rural industries must be considered. Because of the nature of the poultry industry, the methods used in the forecasting of egg production must differ considerably from the methods used in forecasting agricultural crops.

The two main significant factors in egg production forecasting, apart from an appreciation of the influence of external economic factors such as the availability and cost of feed, are (i) the number of actual and potential layers, and (ii) the annual average rate of lay per bird. These correspond broadly with acreage sown and yield per acre, which are the significant factors in crop forecasting.

As with crop forecasting, the main data are obtained from selected farmers, known as honorary poultry correspondents. Unlike crop correspondents who report on conditions in their localities, which may comprise up to 20 farms, the poultry correspondents report only on their own farms, as the nature of the industry renders it impossible for a correspondent to give objective opinions concerning his neighbours' activities.

Information concerning hatchings and sales of chickens is also obtained from a selection of hatcherymen, and this is used supplementary to the honorary poultry correspondents' reports.

Apart from the report on the poultry industry, forecasts were again issued throughout the year in connection with the wheat, barley, maize, grain sorghum, peanut, tobacco, and the spring and autumn South Queensland potato crops. The total number of farmers now co-operating in the Crop Reporting and Forecasting Service as honorary crop correspondents is over 700, including 280 recently appointed poultry correspondents.

Preliminary work was commenced during the year with a view to refining the statistical devices at present employed in crop forecasting. The first task is to measure quantitatively variations between honorary crop correspondents' estimates and actual figures collected by the Government Statistician and to ascertain if any significant ratios can be established from which to develop formulae of probable errors. The calculations involved in this work are fairly lengthy, and with the limited staff available a considerable period must necessarily elapse before the analysis is completed. It is also doubtful if the records, covering as they do five years, and in some cases less, are yet sufficient to produce any significant results. However, the form in which the data is being collated will also simplify analysis, which will assume increasing significance as data in future years becomes available.

Publication of the monthly *Report on Production Trends* was continued throughout the year. There was no basic change in its form of presentation.

Market Price Reporting.

The statistical information collected, recorded and collated by the Market Price Reporters is promulgated in *The Daily Official Market Quotations* and *The Weekly Market Report*. The demand for these increases steadily. The reports, apart from their statistical value, provide topical and essential information on the tone and trend of the market for fruit, vegetables and farm produce. In addition qualities, quantities and sources of supply are defined.

By means of *The Daily Official Market Quotations*, growers, traders and consumers are informed daily of the state of the markets by means of the press and the broadcasting and postal services. Those dependent upon the markets for their livelihood are thereby enabled to be selective in either supply or purchase. Institutions under Commonwealth, State or private control being supplied under contract use this report to assess the accuracy of prices charged, and as the final arbiter in cases of dispute. It is also stipulated as the determining authority for contractors to the District Contracts Board victualling the Armed Services and Immigration Centres.

The Weekly Market Report has a broader basis and deals more fully with trends. As such, its value to the supplier is perhaps greater than the daily quote and because of this receives wide publicity in the country press and growers' periodicals.

The tabulated data of daily price ranges and the averages calculated therefrom are being used as a basis for the preparation of a series of reports dealing with the seasonal pattern and the general trend in prices since January, 1948, of various crops. As mentioned above, four reports have so far been published as Supplements to the *Report on Production Trends*.

GENERAL.

Bulk handling of Wheat.

The problem of bulk handling of wheat in Queensland has continued to claim attention, and following the reports of the various committees set up last year to examine all aspects of the question, temporary bulk-handling facilities were erected at Pinkenba to speed up the handling of export wheat. This installation is proving invaluable in handling the export surplus of six million bushels from last season's crop.

Bulk handling depots have already been established at several country centres on the Darling Downs. The further extension of these facilities should result in a better organisation for delivery of wheat from farms to country storages as well as from storages to port. In the meantime, those depots already established are a source of valuable experience which should greatly assist in the planning of further bulk-handling facilities.

Wheat Stabilisation.

With the expiry of the present wheat industry stabilisation scheme with the 1952-53 season, the question of a new stabilisation scheme has been given considerable attention. Apart from the detailed study of all aspects of wheat stabilisation within the Branch, officers have been actively engaged at a series of conferences with other State and Commonwealth authorities during the year with the object of formulating a new scheme.

The problem has been complicated by developments in overseas grain markets during the last eight months or so. The fall in export prices of coarse grains, the good grain harvests overseas and the building up of considerable stocks on the North American continent, together with the refusal to date of the United Kingdom to sign the new International Wheat Agreement, have all served to cloud the issue. General proposals for a new scheme have, however, been put forward by the various parties. These are still under consideration.

Miscellaneous.

The Marketing Division was engaged from time to time throughout the period in activities relating to the marketing problems of many other industries, of which mention might be made of linseed and ginger, both of which have been affected by the reduction in prices of imports and their readier availability from overseas. Both of these industries were subject to examination by the Tariff Board. The barley industry also encountered difficulties, though these were of a different nature, and involved the handling of a crop far in excess of the normal intake and the selling of it on overseas markets that weakened considerably during the season.

The Second-hand Fruit Cases Act, which has operated up to the present only in respect of the area around Brisbane, was amended during the year to extend its scope and to provide for the setting up of Committees in other parts of the State if this should be desired by growers.

Careful examination of the coarse grain export position was continued during the year. This was particularly necessary in 1952, as the seasonal conditions for summer grains were poor and the total supply position had to be carefully weighed against demand. The good winter and assurances of an excellent wheat crop relieved

this position considerably, and early in 1953 the Commonwealth Government in consultation with the Department decided to remove coarse grains from export control for the time being.

The Statistical Section has co-operated during the year with the Bureau of Agricultural Economics in the preparation of cost and price indices which it is expected will provide useful measures for economic analysis in agricultural industries.

Many organisational and marketing problems were encountered in the fruit industry during the year. The increasing trend towards reliance on processing rather than the vagaries of the fresh fruit market to achieve stability has resulted in both success and failure. Pineapple and tropical fruit growers in the Townsville district and strawberry growers at Redland Bay suffered reverses due to unwise and uneconomic expansion of processing facilities that were found either unsuitable for the purpose intended or too costly to run to provide the economic price the grower had been led to expect.

Further examination has been given to the reconstitution of The Onion Marketing Board, which ceased to function on 20th July, 1952. Growers found considerable difficulty in marketing their crop from the 1952 season owing to glutted outlets, and uneconomic prices prevailed for some months. No finality has been reached in this matter and a new scheme of marketing is still under consideration.

PRIMARY PRODUCERS' CO-OPERATIVE ASSOCIATIONS.

During the year one new Association was registered, viz., Moreton Growers and Processors Co-operative Association Limited.

The Mount Sibley Co-operative Dairy Company Limited, which was already registered under the Companies Act when the Primary Producers' Co-operative Associations Act was placed on the Statute Book in 1923, has converted to a primary producers' co-operative association and has been registered as Mount Sibley Co-operative Dairy Association Limited.

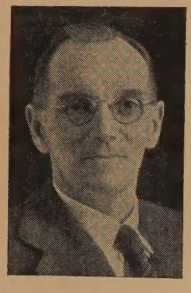
A number of associations have amended their rules to suit changing circumstances, most of the amendments being designed, as was the case in the previous year, to enable associations to obtain further capital to cope with expansion of operations.

Figures compiled by the Government Statistician indicate strikingly the importance of primary producer co-operatives in the State's rural industries. In total their annual income now exceeds £30,500,000, of which sales account for more than £29,000,000. Share capital exceeds £2,700,000 and loan capital £700,000. Reserves total more than £2,500,000, whilst land and buildings are valued at more than £2,250,000, and machinery, plant and other fixed assets at more than £4,000,000.

The Registrar of Primary Producers' Co-operative Associations, as the representative of the Department, attended meetings held during the year of the Co-operative Advisory Council set up under the Co-operative Societies Acts.

STANDARDS BRANCH.

Mr. F. B. Coleman, Standards Officer.



The Agricultural Standards Act of 1952 was proclaimed on 24th July, 1952. This Act consolidated the legislation relating to the control of seeds, fertilizers, growth-regulating materials, lime, stock foods, veterinary medicines and pest destroyers, and provided for the control of quality of marking preparations and testing reagents.

The first 10 months of the operations of the Act have proved its usefulness in achieving smoother working of the activities of the Branch, in particular in the elimination of anomalies which had occurred with the previous Acts. The consequent reduction in the number of forms has also proved very satisfactory both to the Department and to traders.

The Agricultural Standards (General) Regulations of 1952 came into operation with the proclamation of the Act. These cover matters of uniform application to the various requirements covered by the Act, such as forms and charges for services of an Inspector to take samples. The Agricultural Standards (Veterinary Medicines) Regulations have also been introduced. In due course, the remaining regulations enacted under the previous Acts will be revised.

During the year, 410 sellers of agricultural requirements were visited, against 320 during the previous year. Inspections covering the coastal area from the New South Wales border to Townsville and as far west as Roma and St. George were made.

SEEDS.

Table 1 sets out details of seed samples examined at the Brisbane Seed Testing Station.

TABLE 1.

SUMMARY OF SEED SAMPLES EXAMINED.

—	1951–52.	1952–53.
Samples received from—		
Inspectors of Branch	4,327	4,782
Seed Certification Officers ..	221	248
Sellers	2,257	3,818
Buyers	155	165
Government Departments ..	1,276	2,403
Experimental test samples ..	467	42
Total samples examined ..	8,703	11,458
Samples which failed to comply submitted by inspectors—		
(i.) Farm seeds—		
(*a*) Low germination ..	100	101
(*b*) Purity	315	106
(ii.) Vegetable seeds ..	274	257
(iii.) Packeted seeds	15	18

Samples received from Inspectors during the year totalled 4,782, an increase of 455 over the 1951-52 figure, this in spite of the fact that Inspectors' activities had to be curtailed due to the increased number of Rhodes grass samples (761, against 618 last year). Also, 529 samples representing grain being exported were examined.

The principal prohibited material found in samples and the number of times they occurred were as follows:—

Carthamus lanatus (saffron thistle)	1
Cirsium arvense (perennial thistle)	1
Convolvulus arvensis (bindweed)	4
Cuscuta spp. (dodder)	6
Datura spp. (datura, thornapple)	49
Ipomoea spp. (bell vine)	56
Melilotus indica (hexham scent)	28
Raphanus raphanistrum (wild radish) ..	2
Rapistrum rugosum (turnip weed)	75
Salvia reflexa (mint weed)	209
Silybum marianum (variegated thistle) ..	11
Sorghum halepense (Johnson grass)	12
Verbescina encelioides (wild sunflower) ..	14
Insect infested seed	24
Sorghum in Sudan grass	30

Restricted weeds (that is, weeds the presence of which is permitted only in specific numbers per oz. of small seeds, or per lb. in wheat or larger seeds) found in samples were as follows:—

Alternanthera repens (khaki weed)	2
Argemone mexicana (Mexican poppy) ..	32
Brassica sp.	12
Cirsium lanceolatum (spear thistle)	7
Echium spp. (bugloss)	2
Marrubium vulgare (horehound)	6
Polygonum spp. (wireweed)	162
Sisymbrium spp. (wild mustard)	3

The presence of these weed seeds indicates failure to use efficiently the modern cleaning machinery now available and shows lack of appreciation by those concerned of the farmers' great need for better seeds for sowing.

Owing to the greatly improved quality of Rhodes grass seed, the minimum standard of germination prescribed in the Regulations of the Seeds Acts (30%) was restored.

Table 2 sets out details and comparisons with the previous year's work relative to action taken with seeds found not to comply with the Act's requirements.

TABLE 2.

ACTION TAKEN ON UNSATISFACTORY SEEDS.

—	1951–52.	1952–53.
Cleaned under the supervision of an Inspector—		
Farm seeds	244 bags	..
Destroyed or otherwise rendered unsuitable as seed—		
(i.) Farm seeds ..	370 bags	400 bags
(ii.) Vegetable seeds	2,285 lb.	1,551 lb.
(iii.) Packeted seeds	5,757 packets	4,941 packets

Seed Cleaning.

To enable the farmer to obtain the best return from his land, he must plant first-quality seed. Apart from trueness to type, seed can be brought up to this standard by one method only, that is by efficient cleaning. Selling seed of high quality not only aids the farmer but also is a good advertisement for the seller. An increase in the number of cleaning units has resulted from the increasing quantities of seed being handled by seed merchants in the State.

In the past 12 months at least four large up-to-date cleaning machines have been installed throughout the seed-producing areas of southern Queensland, so that there are now approximately 36 efficient cleaning plants operating in the State.

It is expected that in the next 12 months several more units will be purchased. The effect of the State's increased seed-cleaning capacity has made itself apparent by the minimising of delays associated with seed cleaning.

With advances in the design of modern machines, it should be possible to clean almost every type of seed, and with the distribution of the seed-cleaning units throughout the seed-growing areas of Queensland as it is, there should be no excuse for seed being offered for sale which does not comply with the standards prescribed.

The seed-cleaning equipment in Queensland ranges from portable machines to the specialised specific gravity machines. The former, operating often under great difficulties, cannot be expected to produce samples equal to specialised stationary machines, particularly when two or more such units are operated in conjunction with each other and emphasis is placed on quality, not quantity.

It must be emphasised that a skilled operator is needed for these machines in order to obtain the best results.

Certified Seed.

Since the inception of seed certification in this State, expansion has occurred both in quantities of seed produced and in the types of crops added to the scheme. During this period, considerable modification has been necessary in order to provide for simplification of procedure.

The use of Kipp Kelly Specific Gravity Separators has resulted in the recovery of much hybrid maize and sorghum seed, including Sudan grass, that would otherwise have been rejected because of low germination. Additional up-to-date machinery is under way for installation in the State. It is most desirable that careful attention be paid to the rejection of any area that does not have first-class cleaning facilities available within a reasonable distance. Failure to clean some seed so as to render it suitable for certification has occurred, resulting in the rejection of the crop for certification and waste of seed certification officers' time and efforts that could have been used to advantage elsewhere.

Experience has indicated the need for tightening up in the matter of rejecting for certification crops in which examination is made difficult by weed growth.

Unfortunately, considerable difficulty is met where growers have made application for registration of areas which have been approved, and, when sowing is completed, it has been found that neighbours have planted in such a way as to destroy isolation.

Table 3 sets out the amounts of certified seed produced since 1950, together with the amounts which have been rejected due to low germinability or the presence of prohibited seeds.

TABLE 3.

PRODUCTION OF CERTIFIED SEED.

Crop.	1950.		1951.		1952.	
	Certified.	Refused.	Certified.	Refused.	Certified.	Refused.
Hybrid Maize (bushels)	2,822	24	4,287	55	3,584	111
Grain Sorghum (bushels) ..	1,550	557	5,052	142	4,871	995
Sweet Sorghum (bushels) ..	171	..	..	..	207	320
Sudan Grass (bushels)	78	..	383	24	2,074	587
French Beans (bushels)	140	18	..	..	60	..
Cowpeas (bushels)	..	..	..	..	102	..
Tomato (lb.)	128¼	..	99	10½	318¾	9¼

So far, 1,248 bushels of hybrid maize seed and 23¾ lb. of tomato seed have been certified for the current season. These figures are incomplete, as harvesting has only just begun.

Certified Hybrid Maize Seed.

Of the 41 growers approved for the production of certified hybrid maize, there are now 21 still in active operation. An objective, so far not reached, is for each farm to be serviced by more than one person who has served a period of probation, thus ensuring that in case of sickness or accident there is an approved person present during the detasselling period of about three weeks to supervise such operations so as to ensure efficient work. This year some 30 acres of maize had to be rejected for certification because of failure to carry out this work effectively.

Following on steps taken to improve the quality and appearance of certified hybrid maize seed, with the objective of not certifying unless the germination is 90% or better, with an infinitesimal amount of inert matter, it is pleasing to note a vast improvement in this regard. However, failure of some growers to hand-select cobs results in a certain amount of mouldy and insect-damaged seed being included in the sample, thus necessitating recleaning.

It is known that some hybrid maize has been sown in areas quite unsuitable for the particular strains. This is a matter which it is impossible to control, but these unsatisfactory results could act adversely to hybrid maize.

The grouping of areas for production of certified hybrid maize seed in the various districts is most desirable in order to utilise most economically the inspecting officer's time.

According to figures supplied by the Government Statistician, 27·36% of the total maize produced south of Mackay in 1951-52 was grown from hybrid maize seed, as against 16·49% in the 1950-51 season. Hybrid maize sown in the undermentioned districts in the 1951-52 season represented the following percentages of the total maize planted:—

	Per Cent.
Darling Downs	39·62
Moreton	9·06
Maryborough	30·51

The relatively low increase in the Moreton area may possibly be attributed to the fact that substantial areas of maize are planted for green feed, and there may be a reluctance to pay the higher price for hybrid seed when the production of grain is not the primary factor. South of Mackay the average yield of hybrid maize per acre during the 1951-52 season was 6·75 bus. per acre higher than the yield from open-pollinated maize.

During the seasons under review (1950-51 and 1951-52), the amount of hybrid maize certified was respectively 4,287 and 3,584 bushels, which, if sown at say 8 lb. per acre, should have planted approximately 30,000 and 25,100 acres respectively.

Certified Sorghum Seed.

Grain Sorghum.—The production of certified sorghum seed is much simpler in practice than that of hybrid maize. Careful growers can save their own seed with a reasonable prospect of trueness to type over a period, so the demand for certified sorghum seed is limited to those growers who desire from time to time to renew their strain.

A perplexing problem with sorghum seed for certification has been the rapid decline in viability because of incipient germination due to dampness of grain and other obscure causes; 20·4% of seed harvested was rejected due to germination being below the minimum prescribed by the regulations. This matter is being investigated.

Sweet Sorghum.—The production of seed of this crop appears to be difficult, as was indicated last year by the refusal to accept for certification 320 bushels out of a total production of 527 bushels. This was due to the germination of the seed harvested being below the prescribed minimum.

Sudan Grass Seed.—No crops were sown for certification during this year because of adverse weather conditions.

Production of this seed since its introduction to the certification scheme is expanding very slowly. Its chief merit is freedom from Johnson grass seed and sorghum hybrids.

Irregularity of seed maturity in considerable portions of the crops seems to be very prevalent. This may or may not be connected with adverse seasonal conditions and results in faulty germination. Here again specific gravity separators have enabled the recovery of a considerable amount of seed.

The seed certification scheme now includes "Sweet" as a variety of Sudan grass. This is a cross between Sudan grass and Leoti sweet sorghum and retains the sweetness of a sweet sorghum. Seed is now available for sowing for certified seed production during next season.

Certified Beans.

Considerable difficulty has been encountered in the production of certified Brown Beauty bean seed due to outbreaks of disease.

During the current year, as a result of work carried out by the Science Branch of the Department, considerable clarification of the diseases affecting beans has occurred, resulting in a prohibition against halo blight and common bacterial blight, in place of a complete prohibition against all bacterial blights.

Much greater care is needed in threshing seed beans, as far too many are injured in this process, resulting in low germination.

A minimum germination standard of 90% should be obtained readily with properly harvested seed beans. When bean seed germinates 75%, a reduced stand is obtained, resulting in unnecessarily high production costs.

One of the problems facing growers is the hand-picking of seed. A considerable amount of this work could be eliminated by the use of specific gravity Kipp-Kelly machines.

It would appear that some growers desire to have their seed cleaned at the lowest possible cost, regardless of the efficiency of the cleaning machine. Often the lowest cost of cleaning can prove in the long run to be the most expensive, due to recleaning being necessary.

Certified Tomato Seed.

This seed is produced in the Stanthorpe area.

So far the demand for certified tomato seed has not reached production possibilities. Unfortunately, some seed is lost every year due to lack of drying of the seed before bagging, causing loss of germination.

This year, two areas of Q3 tomatoes were rejected due to the presence of bacterial canker, a disease prohibited under the tomato seed certification rules.

Certified Cowpea Seed.

Last season 102 bushels of Reeves cowpea seed from 10 acres were certified. This season 139 acres have been registered.

MATERIAL OTHER THAN SEEDS.

Of the 305 samples obtained by Inspectors, 35 fertilizer and lime and 50 stock food samples failed to comply with either the guaranteed or prescribed standards (Table 4). Included in these were samples representing 679 bags of dolomitic lime—really an earthy material—and in accordance with the provisions of the Act the necessary action was taken to ensure that this material was removed from sale. What was recoverable by relabelling with a reduced guarantee was then allowed to be sold and the balance was destroyed.

TABLE 4.

SUMMARY OF ACTION ON MATERIALS OTHER THAN SEEDS.

—	1950–51.	1951–52.	1952–53.
Samples received from—			
Inspectors	137	152	305
Buyers	10	1	12
Seized (bags)	..	..	679
Reconditioned (bags) ..	..	..	164
Destroyed (bags)	..	..	586

With regard to the samples found to have minor deficiencies, a suitable warning was issued to the manufacturers of the preparations concerned.

Complaints by farmers involving the death of stock required investigation. One of these revealed that molasses fed to poultry contained a resin varnish, the result of the molasses being put into drums which previously contained this substance. A warning was issued to all sugar mills and others packaging molasses for sale as a stock food. The second case concerned the death of poultry after feeding a prepared poultry food. Samples of this food indicated a considerable excess of salt, and an investigation at the place of manufacture revealed carelessness on the part of operatives. A third case, involving the loss of pure-bred dairy stock, revealed that the farmer had not adhered to the dilutions set out in the directions for use on a container of cattle dip used. Under the circumstances, no redress was possible against the manufacturer for the loss sustained.

In another instance, although no fatalities occurred with stock, a quantity of lucerne chaff purchased by a farmer was found to contain parts of *Datura* sp. and the bulk was forthwith destroyed.

Registration.

The Pest Destroyers and Veterinary Medicines Boards have been replaced by the Agricultural Requirements Board as a result of the proclamation of *The Agricultural Standards Act of* 1952.

During the year these Boards reported upon the efficacy of 700 preparations—644 pest destroyers and 56 veterinary medicines—of which 10 pest destroyers and 11 veterinary medicines were refused registration.

An appeal against the Board's decision to refuse to recommend the registration of a veterinary medicine was unsuccessful.

During the year, 1,324 preparations were registered under the Agricultural Standards Act or the Acts superseded by this Act, in comparison with 810 and 924 for the previous two years.

Renewals of fees to cover registrations effected or to accompany new applications to the total of 1,728 preparations were received this year

Fertilizers.

Table 5 sets out the prices of fertilizers (f.o.r. Brisbane) for the years 1949 to 1953.

Production of sulphate of ammonia at Risdon (Tasmania) is not likely to be commenced in the near future.

TABLE 5.

FERTILIZER PRICES.

Name.	1949. November.	1950. July.	1951. March.	1952. April.	1953. June.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ammonium Sulphate (20·5% N) ..	22 17 6 (*a*)	26 17 6 (*a*)	26 17 6 (*a*)	34 7 6 (*a*)	37 0 0 (*a*)
Superphosphate (22% P_2O_5) ..	7 10 0 (*b*)	9 15 0 (*b*)	9 15 0 (*b*)	13 17 9 (*b*)	12 6 9 (*b*)
Blood and Bone (5 : 15 : 0) ..	8 10 0	8 10 0	12 10 0	14 15 0	19 8 6
Muriate of Potash (60% K_2O) ..	30 18 0	30 18 0	34 8 0	38 8 6	35 8 6
Sulphate of Potash (48% K_2O)	..	..	..	45 5 0	40 5 0

(*a*) Less 7s. 6d. for cash.

(*b*) Less 5s. for cash.

There are now available ample supplies of sulphate of ammonia, superphosphate and potash. Organic fertilizer is still in short supply, with little prospect of any increase in output.

Stock Foods.

During the latter part of 1952, prepared stock foods with a low protein content were offered for sale. This may have been due to insufficient supplies of animal protein materials. It is intended to prescribe standards for various stock and poultry foods in the near future, and this should ensure prepared stock foods of better quality.

Plentiful supplies of protein of animal origin became available early in 1953 and various manufacturers have applied for permission to export meat-meal. As slaughtering usually reaches its peak during the period July-December in Queensland, it seems that there is a likelihood of ample supplies of animal protein being available in the immediate future.

IMPORTS AND EXPORTS.

Details of the goods examined at the port of Brisbane for the purpose of the Quarantine Act and/or Commerce (Trade Description) Act are set out in Table 6.

TABLE 6.

SEED IMPORTS AND EXPORTS EXAMINED.

Kind of Seed.	1951–52.	1952–53.
Imports—		
Farm Seeds—		
Clover	28 sacks	..
Cowpeas	4 sacks	277 sacks
Lentils	..	6 sacks
Lupins	233 sacks	229 sacks
Lucerne	30 sacks	34 sacks
Mangel	18 sacks	21 sacks
Rape	47 sacks	110 sacks
Rye grass	4 sacks	4 sacks
Vegetables—		
Beans	190 cwt.	36 cwt.
Miscellaneous ..	6,808 lb.	3,631 lb.
Parcel Post ..	252 parcels	146 parcels
Peas	240 sacks	193 sacks
Swede	..	5 sacks

TABLE 6—*continued.*

SEED IMPORTS AND EXPORTS EXAMINED—*continued.*

Kind of Seed.	1951–52.	1952–53.
Exports—		
Paspalum seed ..	448 sacks	908 sacks
Prairie grass seed ..	137 sacks	134 sacks
Rhodes grass seed	39 sacks	4,163 sacks
Total grass seed ..	624 sacks	5,205 sacks
Miscellaneous packets of seeds	139 packets	172 packets

The rise in the quantity of Rhodes grass seed exported from the Port of Brisbane was partly due to one of the heaviest crops of this seed, which was of the best quality so far produced in Queensland.

Reports were issued on 529 samples of grain submitted by shippers or agents and representing the quantities set out in Table 7, in connection with which the buyers' terms of contract stipulated that a certificate be issued. These figures do not represent the total exports.

TABLE 7.

QUANTITIES OF EXPORT GRAIN EXAMINED.

Kind of Grain.	1951–52.	1952–53.
	Bags.	Bags.
Barley	..	119,454
Canary	745	22,657
Maize	..	2,819
Millet—		
French	2,811	69,508
Japanese	2,618	860
Setaria italica	2,878	15,432
Oats	..	1,823
Rye Corn	600	600
Sorghum	111,001	24,037
Sunflower	..	463

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